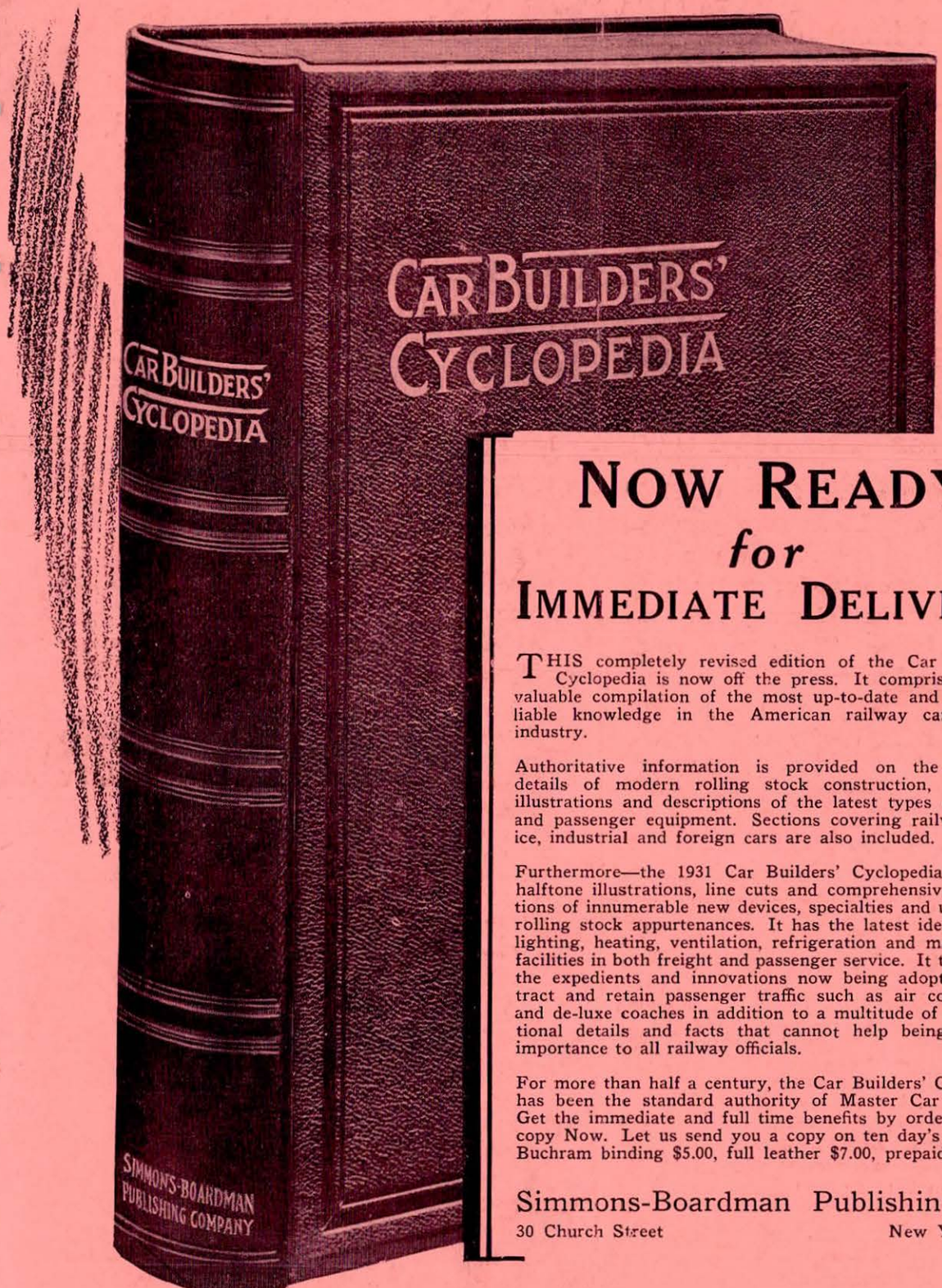
JULY 18, 1931

Railway Age

Founded In 1856



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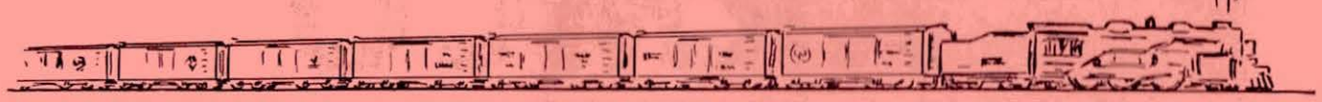
More flexible Motive Power

THE KEY TO GREAT OPERATING ECONOMIES

The High-Wheel Engine equipped with the Bethlehem Auxiliary Locomotive



is equally effective for HIGH STARTING DRAWBAR PULL

AND

for GREAT POWER at HIGH SPEEDS

The additional tractive force which a Bethlehem Auxiliary Locomotive provides places the high-wheel engine on a par with the low-wheel freight engine for starting tractive effort, without sacrificing any of its desirable characteristics. The one class of motive power thus becomes available for a wide range of service with operating economies that it is hardly necessary to enumerate.

These economies result not only from the feasibility of using the same engines for nearly all classes of service, but also from the higher efficiency of these high-wheel engines in the fast-freight service for which they are primarily designed. The reserve tractive force which the Bethlehem Auxiliary Locomotive provides enables them to start and handle under difficult conditions trains of such weight as to utilize the full power of the engine at road speeds.

At the present time, when operating economies are much sought after, the possibilities which the Bethlehem Auxiliary Locomotive offers are worth while investigating.

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The Bethlehem Auxiliary Locomotive is made in both four- and six-wheel types. It is readily installed in place of one of the tender trucks and can be cut in or cut out at will, thus providing an instantly available reserve of tractive force.

BETHLEHEM

AUXILIARY LOCOMOTIVE

Published weekly by Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa. Entered as second class matter, March 9, 1928, at the Post Office at East Stroudsburg, Pa., under the act of March 3, 1879. Address communications to 30 Church St., New York City.

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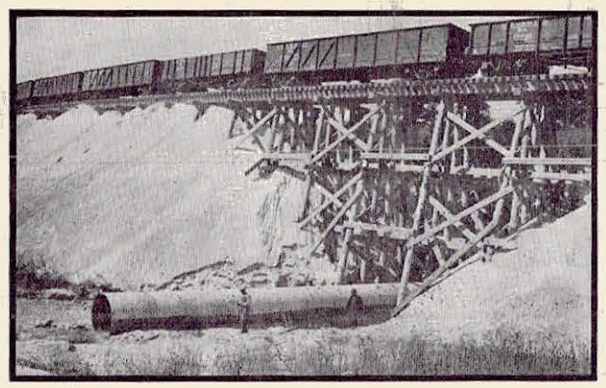

Replacing a 250-foot trestle with 66-inch Armco Paved Invert Pipe in Georgia

IT is a money-saving, far sighted move on the part of any railroad to install culverts and drains of Armco Paved Invert Pipe.

Paving the invert where the wear comes effectively protects the base metal against the constant wear of hydraulic traffic. The service life of the structure is materially increased. The cost per year is materially decreased. Greater safety is assured.

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Railroads everywhere are swinging over to this paved-invert type of drainage material. It means years of trouble-free service at lowest cost per year. Latest facts on Armco Paved Invert culverts and drains will be sent on request. Write today.

Armco culverts and drains are manufactured from the Armco Ingot Iron of the American Rolling Mill Company and always bears its brand.

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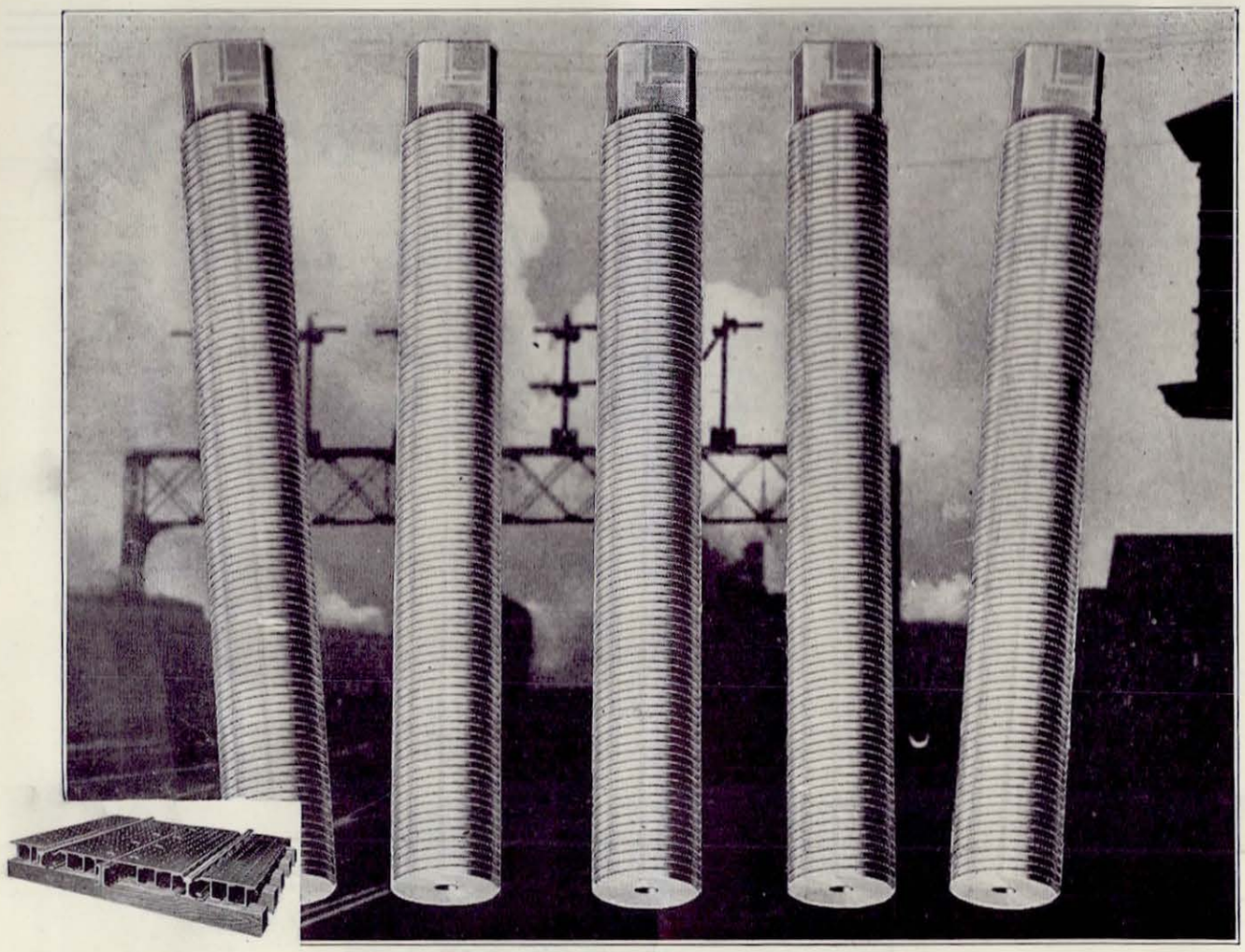

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Ryerson Flue Shop and Spring Shop Equipment is reducing costs in many large railway shops. Ryerson Machinery also includes rail reclamation plants as well as standard machine tools and metal working equipment of all kinds. Write for catalog.

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With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 July 18, 1931 No. 3

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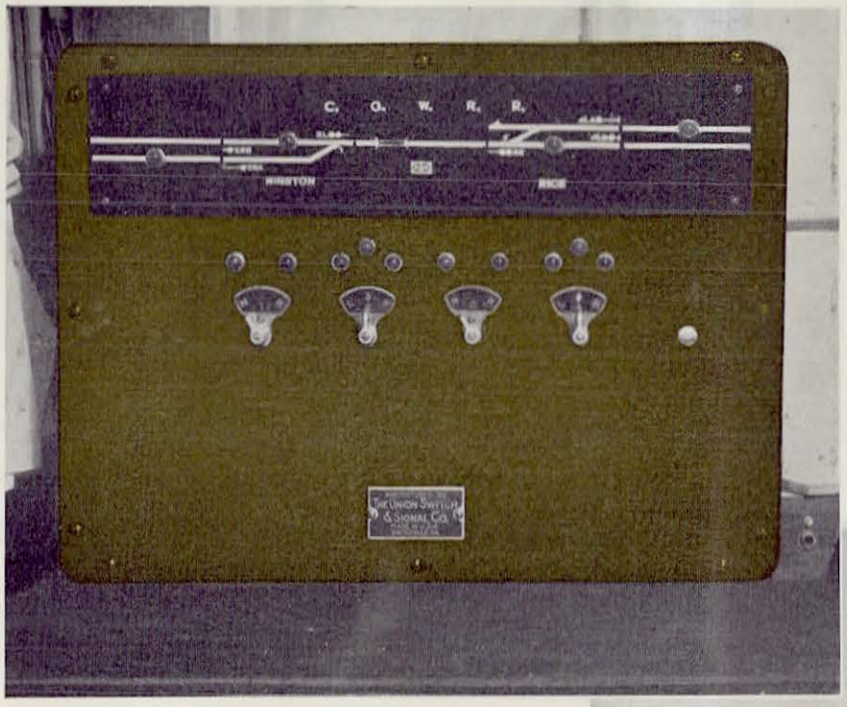
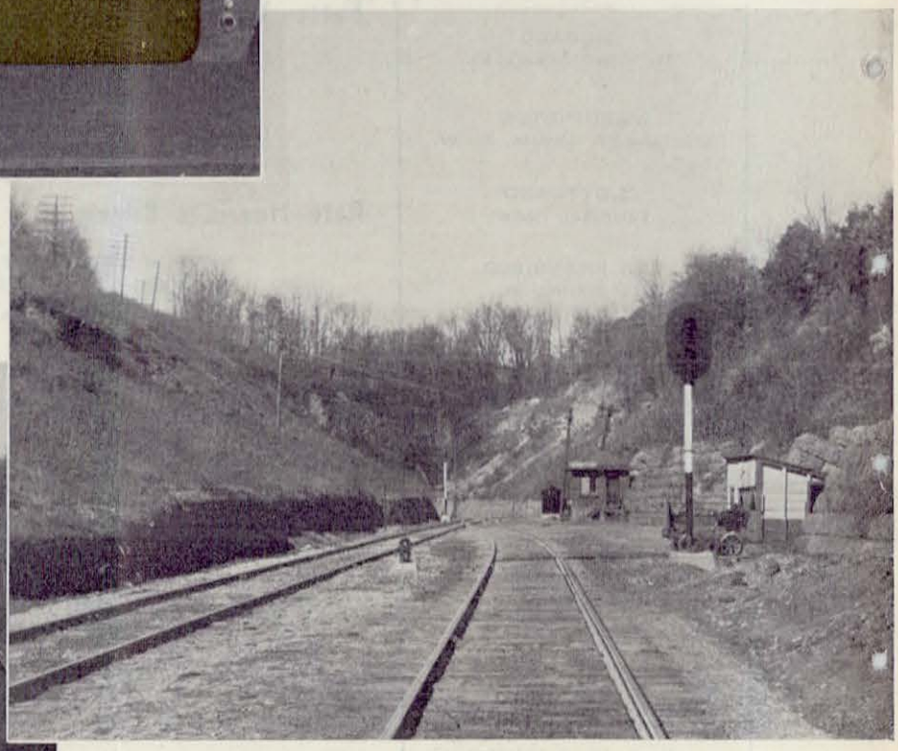
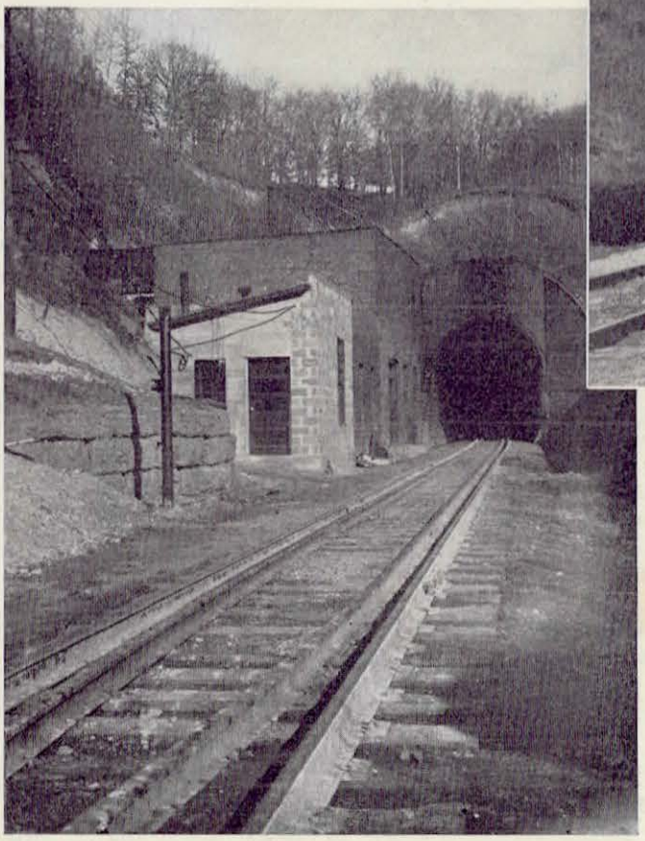


The control machine, located in fan house at West portal of tunnel.





Right Top—East portal, "Union" P-2 signals at both portals. Left Bottom—West portal, fan house in rear, control house in foreground.

Steel relay house at Winston.

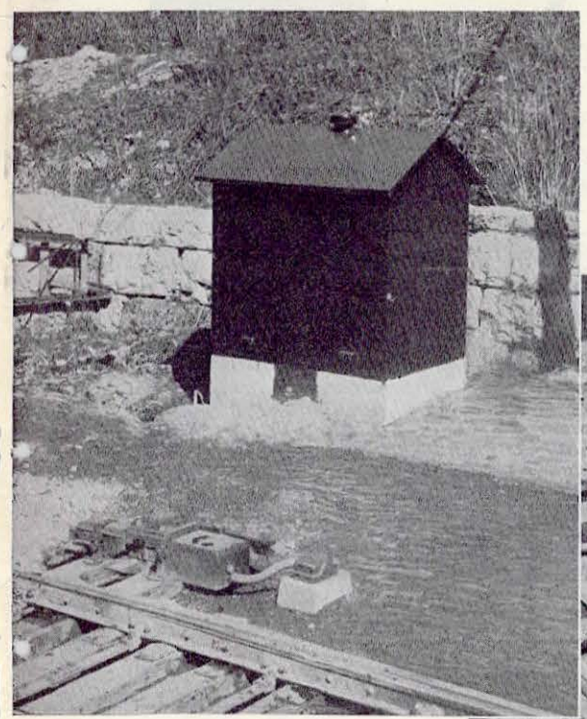
District Offices

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

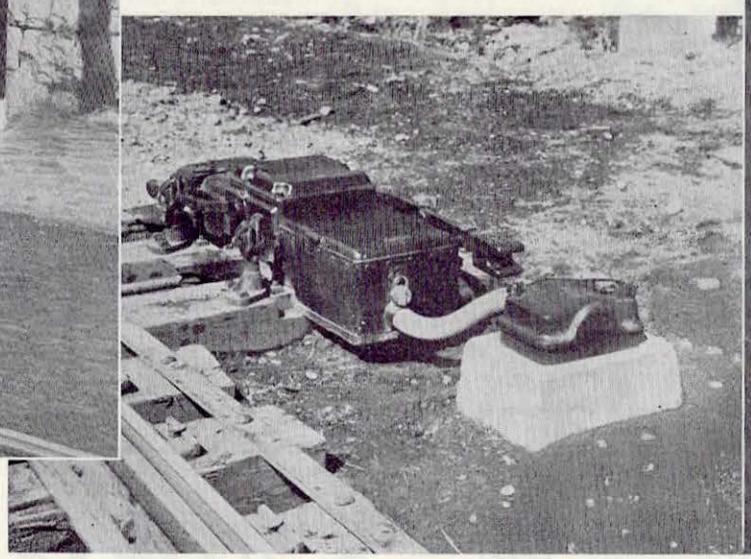
RATE OF RETURN—

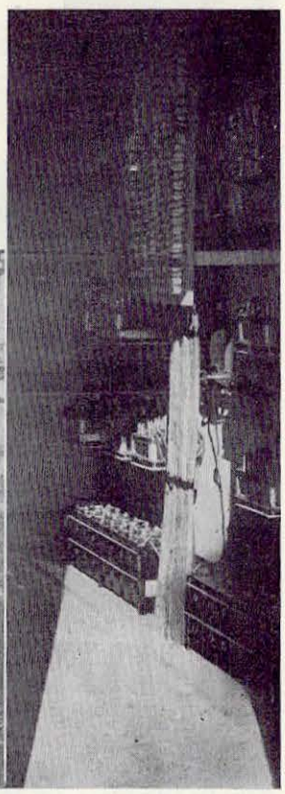
—is being made on an investment in a "Union" Centralized Traffic Control installation by the Chicago Great Western, between Rice and Winston. Here the double track converges to single track where it passes through a 2,460 ft. tunnel located between these two stations. Cost of widening the tunnel or cutting the hill away, to permit double tracking was prohibitive. The plan adopted says Railway Signaling, in its June, 1931 issue, solved this "bottle neck" problem and effected tangible and appreciable savings in operating expenses.

Designed by our engineers and installed by the railroad company's construction forces, this installation involved no extra maintenance. Adding this to the actual savings effected and the greater flexibility and safety of train operation, a compelling illustration of the possibilities of Centralized Traffic Control is presented. Perhaps we can be of service to you in some of your signaling problems. Write our nearest district office.



Right Top—Interior of "Union" steel relay house, factory wired, shipped completely assembled, neat installation, better shelter for equipment. Simplifies construction, testing and maintenance. Bottom at Center—"Union" Type M-22 switch movement with point detector. No wasteful consumption of battery energy.

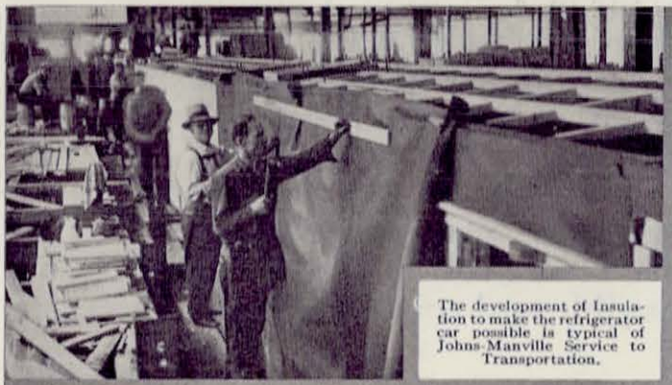




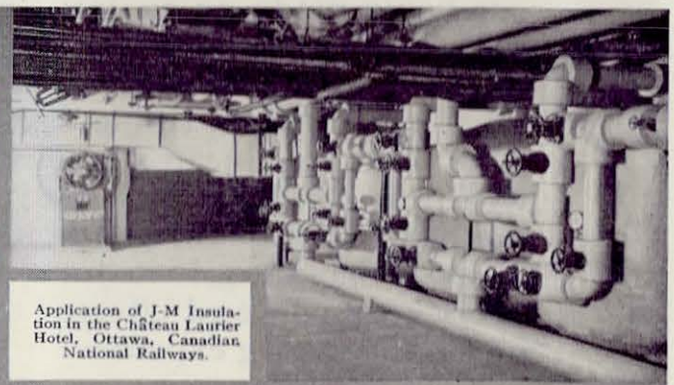
1881 Union Switch & Signal Co. 1931

SWISSVALE, PA.

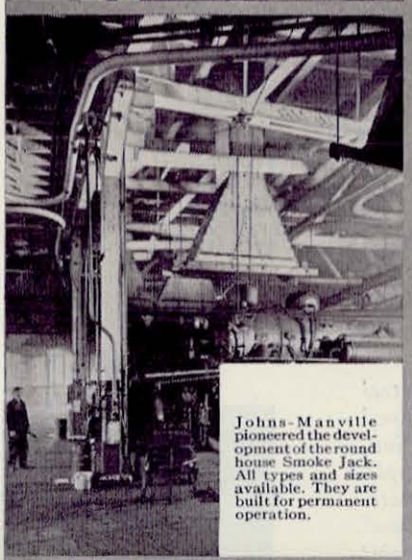
"...Cut costs still



The development of Insulation to make the refrigerator car possible is typical of Johns-Manville Service to Transportation.



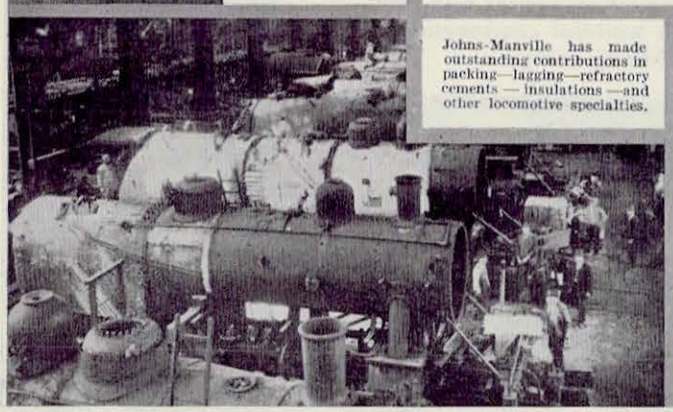
Application of J-M Insulation in the Château Laurier Hotel, Ottawa, Canadian National Railways.



Johns-Manville pioneered the development of the round house Smoke Jack. All types and sizes available. They are built for permanent operation.

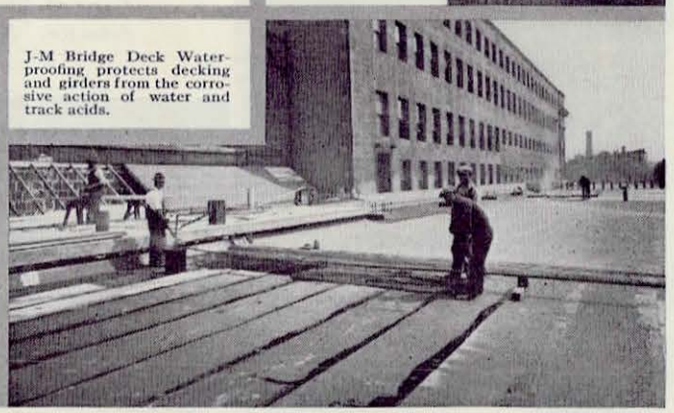
What Johns-Manville has done in the past Johns-Manville will outdo in the future

Johns-Manville Car Insulation and Sound Control materials provide the atmosphere of quiet and comfort that the traveling public expects today.



Johns-Manville has made outstanding contributions in packing—lagging—refractory cements — insulations —and other locomotive specialties.

J-M Bridge Deck Waterproofing protects decking and girders from the corrosive action of water and track acids.



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Service to

NEW YORK · CLEVELAND · CHICAGO

further . . . end waste . . . *improve . . improve"*

Johns-Manville goes all the way with the railroads in meeting the economy challenge of 1931

FOR more than 70 years, Johns-Manville has been closely identified with improvement and economy in railroading. Many J-M engineers are railroad men—many J-M products have been developed exclusively for railroad service—and much of Johns-Manville's extensive research work has been done with and for railroads.

But 1931 calls for greater efforts than ever before. In every railroad department, in round house, machine shop, on the right of way—great economies must be effected, improvements must be made. And better than ever before in history is Johns-Manville prepared to serve and to save.

A new terminal building? J-M engineers can show you savings and improved methods and materials for roof and walls and floors, for heating plant and water system.

A bridge to be built? Johns-Manville can save for you with Asphalt Planking, Flooring, Waterproofing, Celite for Concrete, together with many other special materials that make for permanence and low-maintenance charges.

From coast to coast wherever transportation service is needed, there you will find J-M engineers, inspecting, advising, working—ready to tackle any problem—equipped to show you savings in a hundred unsuspected corners. And it needs but a telephone call to put them to work for you.

So write down across your 1931 economy program, "Call on Johns-Manville Service to Transportation," and if you wish, write direct to Johns-Manville, 292 Madison Ave., New York City.

Transportation

4 mines, 12 factories, 56 branch offices strategically located, service the needs of Transportation promptly and efficiently.

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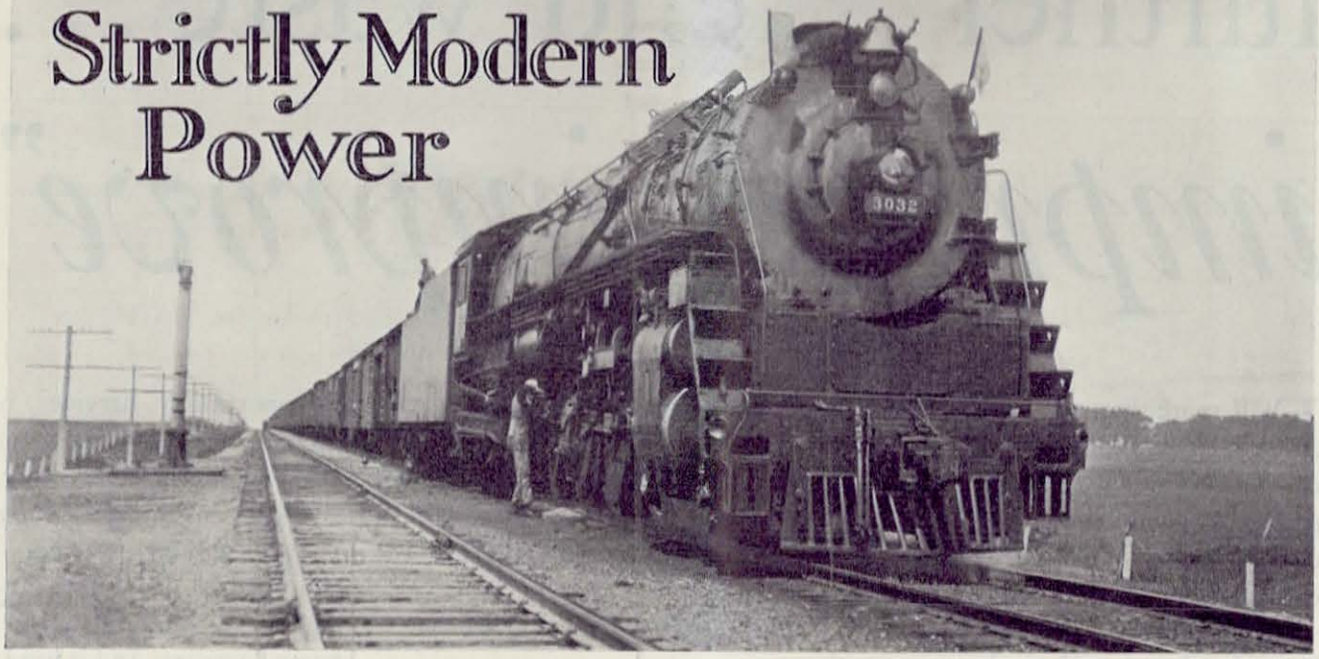


THE accompanying editorial abstract appeared in the RAILWAY AGE, June 20, 1931—

The railroads can make no investment more profitable than replacing this old power with strictly modern units, specially designed for the service.

The period since the World War has been one of the most fruitful with respect to locomotive developments of any in the history of steam railroading. It has seen a complete change in the objective of the locomotive designer from one of producing tractive capacity without regard to speed, to one of producing a power plant capable of delivering a high horsepower output at high speeds. It has seen the beginning of the development of increasing steam pressures. It has seen changes in locomotive boiler proportions which have increased both efficiency and capacity. Special materials have demonstrated their value and mechanical improvements, such as the locomotive bed casting, have been developed which promise a material reduction in the cost of maintenance.

And yet during the past decade the railroads have apparently shown less interest in the possibilities offered by improved motive power than in any decade since the turn of the century. In 1909 less than half of the locomotives on the railroads of the United States were over ten years old. In 1919 three-fifths of the locomotives were over ten years old. In 1929 almost four-fifths of the locomotives were over ten years old and one-third were over twenty years old, while in 1919 but one-tenth were over twenty years old.

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE BALDWIN LOCOMOTIVE WORKS

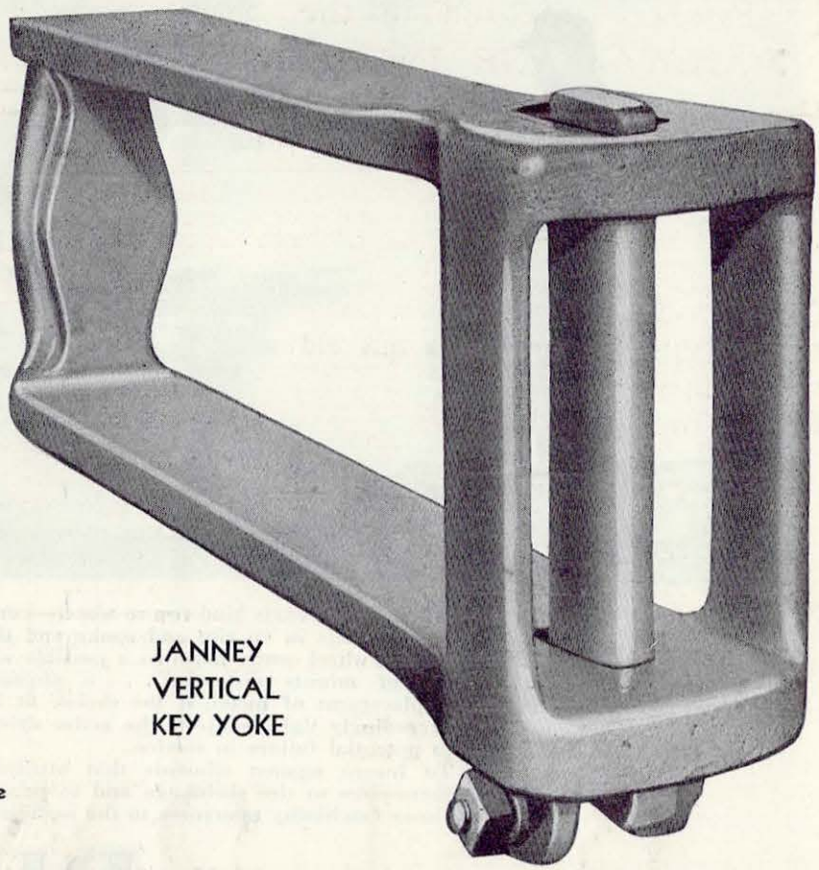
PHILADELPHIA

YOKE MAINTENANCE

14 MONTHS was found by one railroad to be the life of yoke rivets. Their replacements necessitated 10 distinct operations before the car was again in good order.

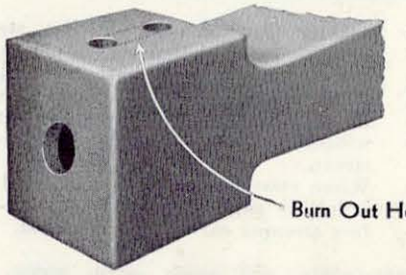
Many roads have eliminated yoke maintenance by the application of Janney Vertical Key Yokes. This yoke can be used without change to existing center sill construction and does not even require new couplers, while it does provide a satisfactory flexible connection between couplers and draft gears.

Railroads have bought large numbers of Janney Vertical Key Yokes and most of these have gone to replace riveted yokes, eliminating what previously had been a considerable item of maintenance.



JANNEY VERTICAL KEY YOKE

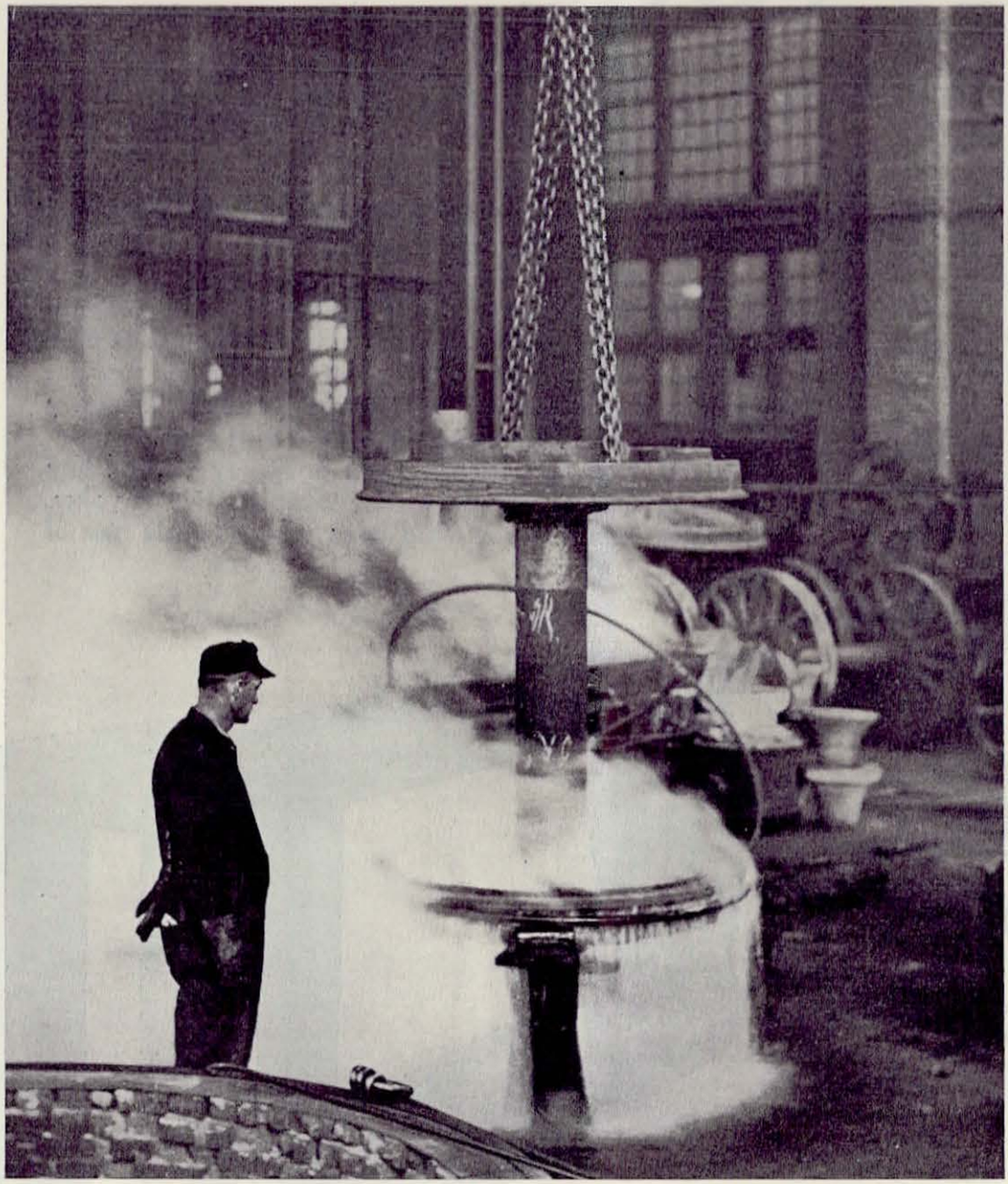
Used with old couplers



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

. . . *when tiny streams bind tire to wheel* . . .



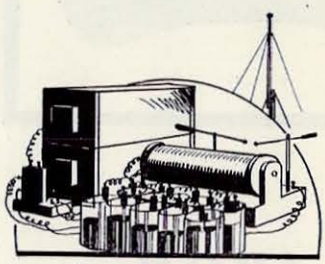
When tiny streams bind tire to wheel—compression sets in on rim and spoke and the driving wheel center becomes a possible victim of *minute distortion* . . . a physical displacement of metal, if the shrink fit be exceedingly tight, subjects the active driver to potential failure in service.

To insure against ailments that attribute themselves to tire shrinkage and to permit closer machining tolerances to the casting—specify Birdsboro-30 casting steel . . . its alloy composition of copper and molybdenum imparts ultimate strength to cast parts of the locomotive listed as vitals . . . it is impervious to corrosion-fatigue and withstands sudden shock and reversals of stress.

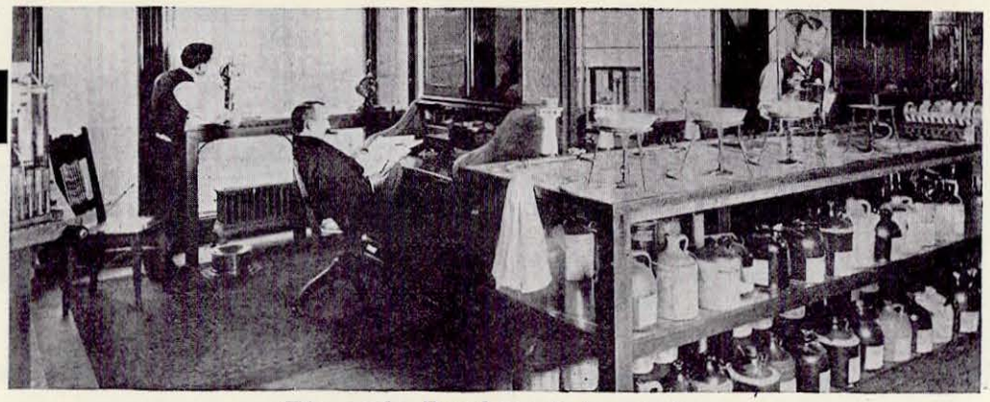
When your next drivers are lifted from the lathe, be sure they're of 30 steel—then let *tiny streams shrink their tightest.*

BIRDSBORO

STEEL FOUNDRY AND MACHINE COMPANY
DESIGNERS AND BUILDERS
BIRDSBORO, PENNSYLVANIA



When Guglielmo Marconi, the father of radio, sent the first wireless message one and three-quarter miles accross Salisbury Plain, England, in 1896, the Dearborn Laboratories had been engaged for nine years in the business of water analysis and scientific correction of scale formation, foaming, pitting and corrosion in steam boilers, a service that has daily increased in importance to steam users since that time.



The early Dearborn Laboratories

Serving Progress

Dearborn service in scientific water correction produces new economies and steps up efficiency. Typical stories of our success as told in reports of service calls by Dearborn representatives are given below:

Overcoming Burst Flues

Kansas: "On May 1, 1927, there were 43 engines in this large terminal for burst flues. The first of 1928 they installed Dearborn wayside treating plants and began using Dearborn Treatment. By April 1928, the flue condition was all cleared up and there were no locomotives held in the terminal for flue repairs."

Stalling through Foaming Overcome

Kansas: "Very heavy foaming water here. They use lime and soda ash treatment and often heavy trains could not get away on the upgrade. After Dearborn Treatment was started, all foaming trouble disappeared."

Leaking Side Sheets Stopped

California: "Formerly it was impossible to get engines over the road without the side sheets leaking. Water treated with lime and soda ash. Dearborn Treatment applied in addition in boiler and tender at the terminal, stopped this leakage and reduced boiler maintenance."

Heavy Scale Controlled

Texas: "116 grain calcium sulphate water in this territory. Flues were removed once a month from all locomotives and sheets were bumped with a pneumatic hammer. Dearborn Treatment removed all scale and has kept the metal entirely clean ever since."

Where Scale Built Up

New England: "Crown and side sheets and all stays and bolts are kept clean to the metal. Previous to the use of Dearborn Treatment, there was a uniform scale throughout their boilers and a building up of scale around bolt heads and stays."

Stopping Firebox Corrosion

Alabama: "Firebox sheets had been replaced in 16 to 18 months due to very severe corrosion. Our treatment brought an end to this trouble and there is no reason now why the sheets will not last the life of the locomotive."

Eliminating Scale in Heaters

Wisconsin: "Feed water heaters in this region scaled up in 3 or 4 trips, so that pumps could not supply adequate water to the boiler. Had been using acid for cleaning. Boiler scale also serious. The Dearborn Treatment cleared up the boilers and also made periodic cleaning of heaters unnecessary."

* * * * * *

Such are the benefits from Dearborn Scientific Water Treatment. Such are the results we are prepared to produce for you with an ability which has seasoned in service to industry for nearly a half century. There is a Dearborn service man near you. Let us send him to call—or write us, describing your conditions and sending gallon samples of your water supplies for analysis and recommendation.

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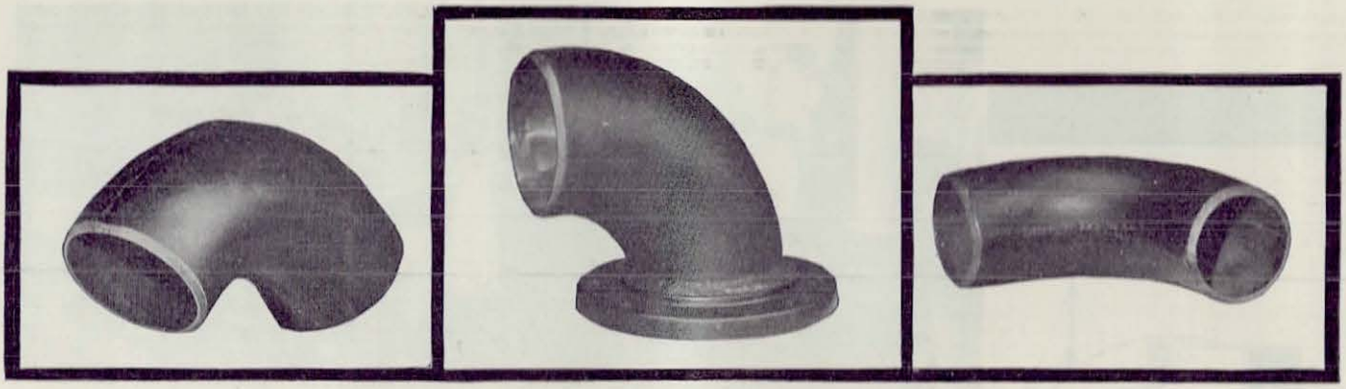
Dearborn

TRADE MARK REGISTERED



NOW AVAILABLE IN BYERS GENUINE WROUGHT-IRON— SPECIAL BENDING PIPE AND WELDELLS!

TWO modern needs are solved by the manufacturing achievement which makes this announcement possible. Wrought iron now offers new solutions to old problems!

SPECIAL BENDING PIPE: This pipe has every quality and characteristic of Byers Genuine Wrought-Iron Pipe — *plus bend-ability!* On cold bends, the extra-heavy bending pipe can be bent to a center-to-center diameter as low as 3.3 times the outside diameter of the pipe! In any industry, there are definite places where this special bending pipe is the utmost in performance and economy.

WELDELLS *(Welding Elbows):* Perfected and manufactured by The Locomotive Terminal Improvement Company, Chicago, wrought-iron Weldells are manufactured exclusively from Byers Genuine Wrought-Iron. They are available in sizes from 2 inches to 12 inches and are fabricated with the same radius and center-to-face measurements as standard radius fittings. In the forging, a tangent is formed on each end, making Weldells interchangeable with standard fittings. Made of the same wrought iron as the pipe, Weldells may be welded directly into a line, saving time, trouble, and money where welding is the method of fabrication prescribed. Unless otherwise specified, both ends are beveled 45 degrees for welding. This new achievement in wrought iron demands your consideration in the interest of service and economy!

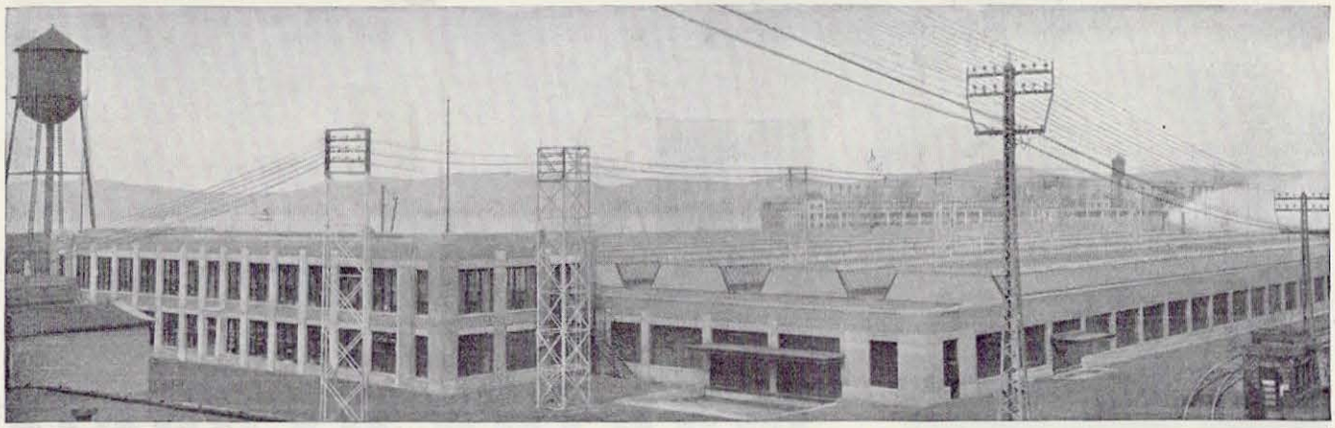
Accurate control of physical and chemical characteristics that modern manufacturing permits makes Byers the best wrought iron ever produced. A bulletin entitled "Pipe Bending" and a folder entitled "Piping Continuity" will be mailed free upon request. A. M. Byers Company, Pittsburgh, Pennsylvania.

These are the Byers Genuine Wrought-Iron Products

Pipe	Couplings
Special Bending Pipe	Weldells*
Tubing	Plate
Casing	Bar-iron
Nipples	Blooms

*MADE FROM BYERS GENUINE WROUGHT-IRON BY THE LOCOMOTIVE TERMINAL IMPROVEMENT COMPANY OF CHICAGO

BYERS GENUINE WROUGHT-IRON PRODUCTS



Chevrolet Motors, Division of General Motors Corporation, Assembly Building, Tarrytown, N. Y., covered with over 400,000 sq. ft. of Featherweight Concrete Insulating Roof Slabs. Many other plants of this Company from New York to California are protected with Federal. Architects: Albert Kahn, Inc.

Today's Greatest Roof Value!

A roof acknowledged for over a quarter century to be the best that money can buy, today offers greater value than ever before.

Scientific research and development through Haydite light weight aggregate, plus economical design, have produced the light weight roof slab (as low as 10 lbs. per sq. ft.) with new insulating value—retaining the known strength, permanence, fire-safety of concrete—and no maintenance! It goes on the same light steel frame that carries other roofs. There is no other roof construction known today that can compare in value with this.

Featherweight Concrete INSULATING ROOF SLABS

are in broad service all over the country, on industrial, utility, and railroad buildings, as well as on prominent public buildings — accepted and used by outstanding architects and engineers. Complete details in our "Catalog and Roof Standards" sent on request.

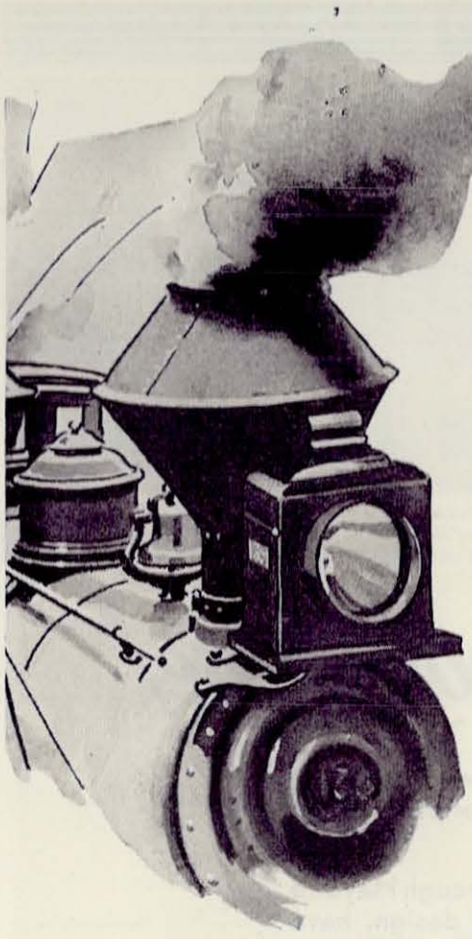
Made, Laid and Guaranteed by

FEDERAL-AMERICAN CEMENT TILE CO.

Executive Offices: 608 South Dearborn Street - - - - - - Chicago

Plants Near CHICAGO · NEW YORK · PITTSBURGH · BIRMINGHAM

FOR OVER A QUARTER CENTURY

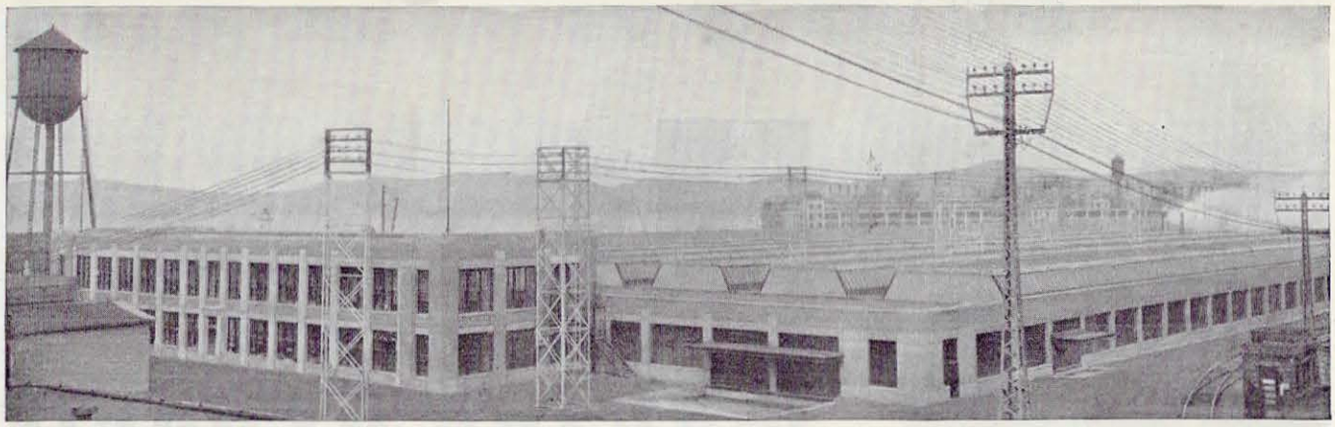


A telephone making experience which began in the day of wood burners, stands back of Western Electric train dispatching equipment . . .

Every Class A Railroad now uses Western Electric Train Dispatching Telephone Systems. The illustration shows a dispatcher on the New York Central.

Graybar Electric Co., Graybar Building, New York, N.Y.
Gentlemen: RA 7-18
Please send information regarding
Railway Train Dispatching Telephone Systems . . ☐
Lead Covered Telephone Cable . . . . . ☐
Public Address System . . . . . ☐
*Name*_____
*Address*_____
*State*_____

Western Electric
TRAIN DISPATCHING TELEPHONE SYSTEM
Distributed by
GRAYBAR ELECTRIC CO.



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*Name*_____
*Address*_____
*State*_____

Western Electric
TRAIN DISPATCHING TELEPHONE SYSTEM
Distributed by
GRAYBAR ELECTRIC CO.

THE MEMPHIS SPECIAL

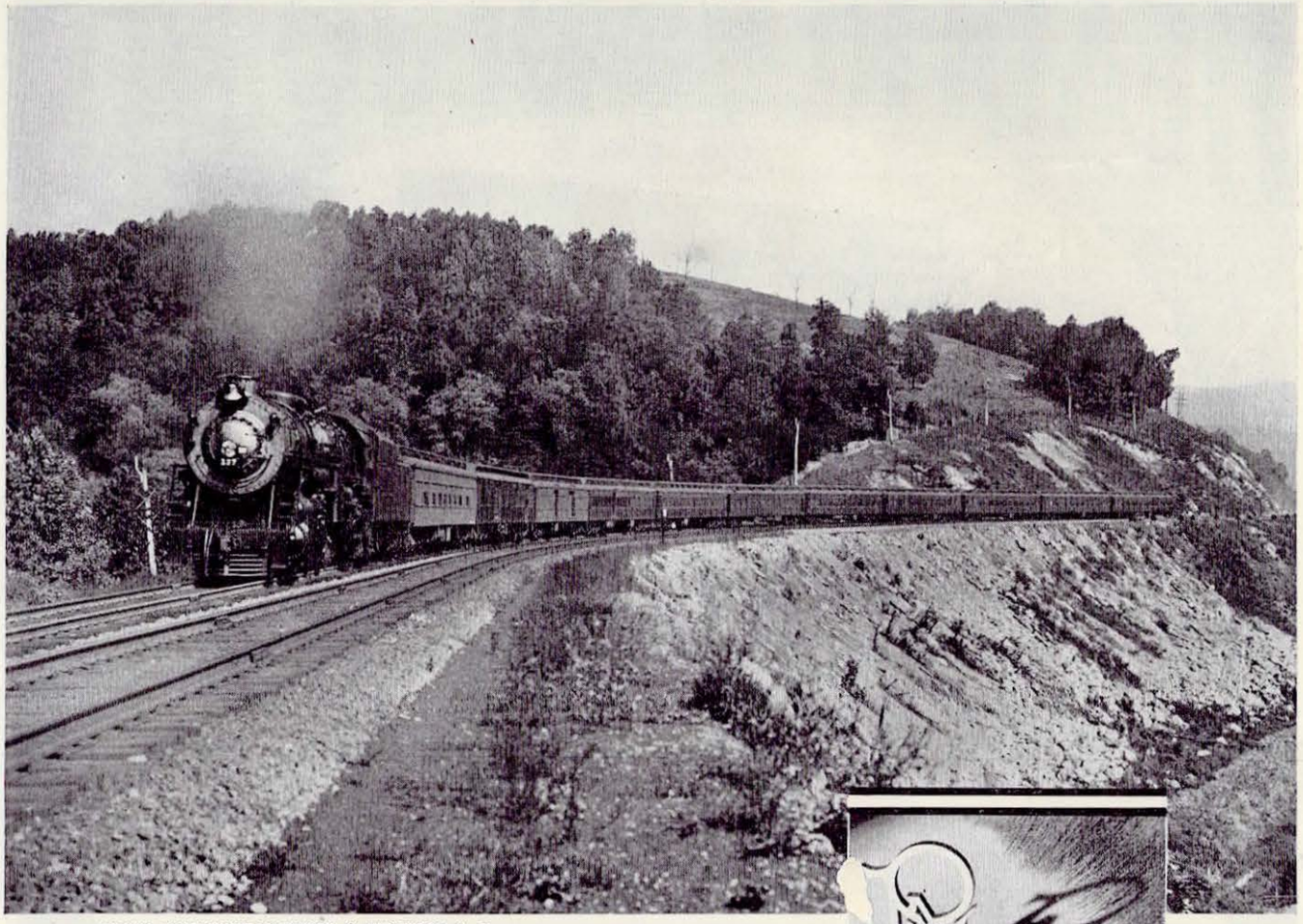

PHOTO COURTESY NORFOLK & WESTERN R. R.

PYLE-NATIONAL headlights and turbo-generators are lighting the way for the "Memphis Special," and other trains of the Norfolk and Western Railway Company. Specialized design, skillful manufacture, and dependable performance have gained universal acceptance for Pyle-National railway electrical equipment.

Write for bulletins describing the complete line.

Export Department:
International Railway Supply Co.
30 Church Street, New York City

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The Holden Company, Ltd.
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Grand Central Terminal ..New York City
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Boatmen's Bank Building ...St. Louis, Mo.
Builders Exchange Building St. Paul, Minn.
Statler Building .....Boston, Mass.
Exchange National Bank Building Tulsa, Okla.
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THE PYLE-NATIONAL COMPANY

General Offices and Works: 1334-1358 N. Kostner Ave., Chicago, Ill.. U. S. A.

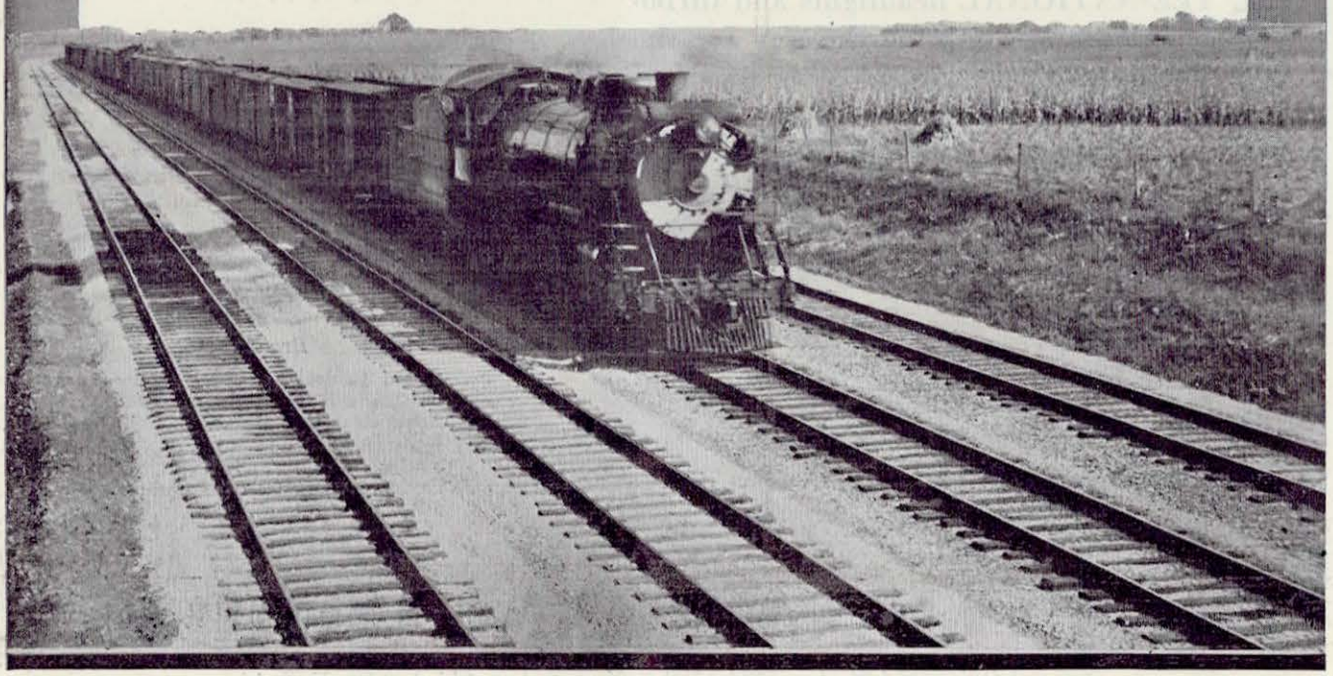
RA 7-18 Gray

HEADFREE RAIL JOINTS

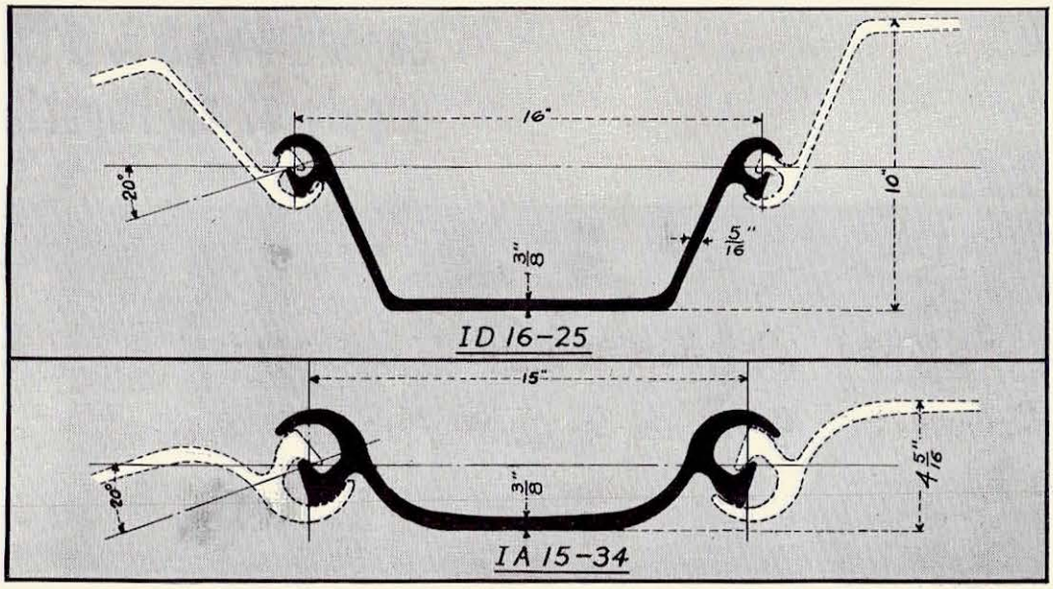
Make Good Track *Better*

The Rail Joint Company

165 Broadway, New York, N. Y.



INLAND
Now Producing
STEEL SHEET PILING



Section	IA 15-34	ID 16-25
Weight per foot	42.50 Lbs.	32.32 Lbs.
Weight per Square Foot of Wall	34.00 Lbs.	25.00 Lbs.
Moment of Inertia	19.10 In.^{4}	49.60 In.^{4}
Section Modulus	8.42 In.^{3}	13.44 In.^{3}
Section Modulus per Lineal Foot of Wall	6.74 In.^{3}	10.08 In.^{3}
Radius of Gyration	1.23 In.	2.25 In.

INLAND is pleased to announce Inland Steel Sheet Piling. The addition of this product is in accordance with the policy of constantly broadening the range of Inland products and Inland service to meet more completely the needs of steel users.

The two sections, ID 16-25 and IA 15-34, shown in the accompanying diagrams, are now being produced. Other sections will follow so that, in the near future, the line of Inland Steel Sheet Piling will be complete.

In keeping with Inland standards of quality, exhaustive tests have been made which indicate that in strength and driving qualities the Inland sections are unsurpassed.

Already, Inland Steel Sheet Piling has been used with complete success. Buyers may be assured that this new product will be manufactured with the same painstaking thoroughness that has typified all Inland products for nearly four decades.

Inland would welcome the opportunity of conferring with you regarding your requirements of steel sheet piling. INLAND STEEL COMPANY, 38 S. Dearborn Street, Chicago, Ill.

INLAND
ABLE SERVANT OF THE CENTRAL WEST
STEEL

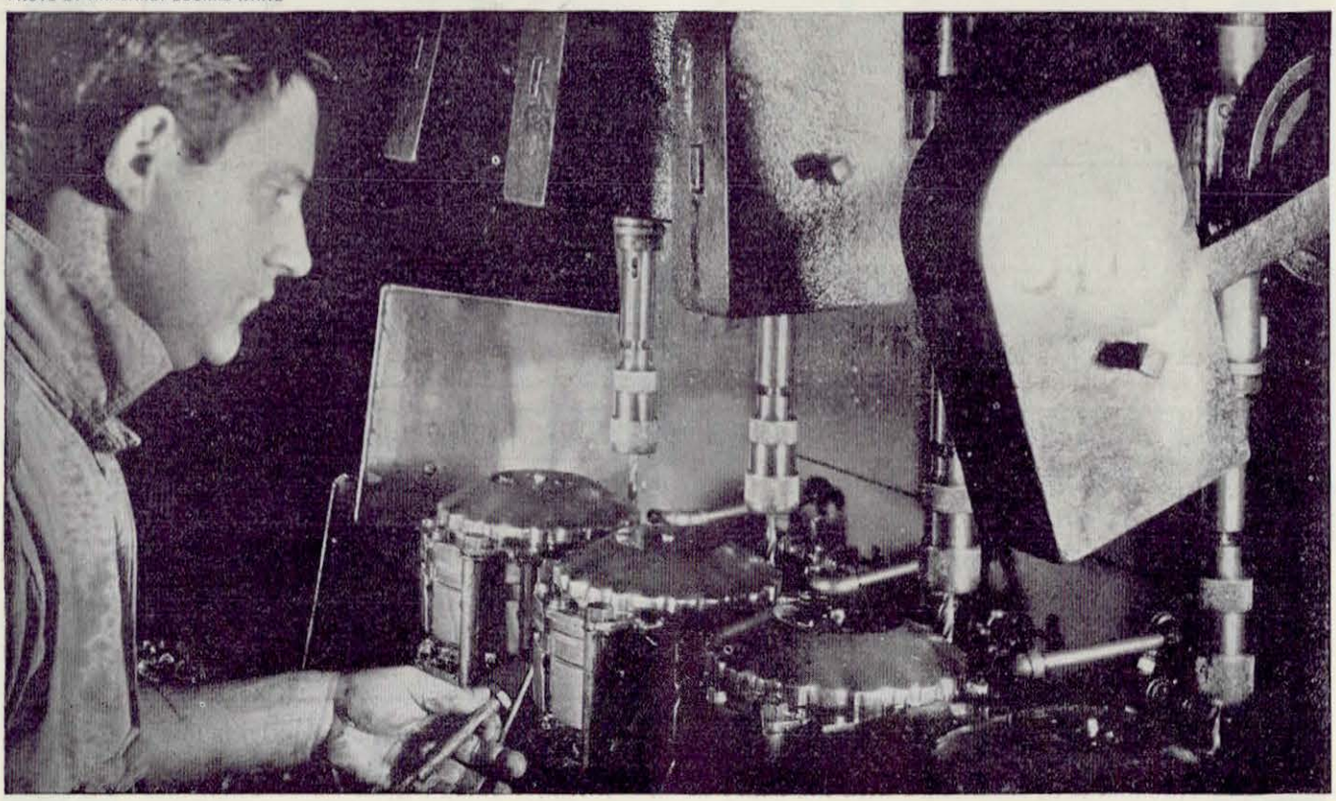
Sheets Bands Structurals Bars Plates

Track Accessories Rails Rivets Billets Piling

AN AUTOMOTIVE TRUST FULFILLED

Leading motor car builders depend on R B & W for entire supply of an important bolt

PHOTO BY MARGARET BOURKE-WHITE



It's an important bolt in motor car assembly. A highly specialized bolt. We make millions of them every year for one of the very largest builders of popular-priced cars. We make this builder's entire supply of these important bolts.

That's confidence on the part of the automobile company. Confidence in quality and uniformity of the product. Confidence in our ability to ship the required volume, day after day, to the company's numerous assembling plants. Confidence that centering its entire requirements of this important bolt in one supplier will assure a steady volume and that no assembly line will be held up by shortage or defective stock.

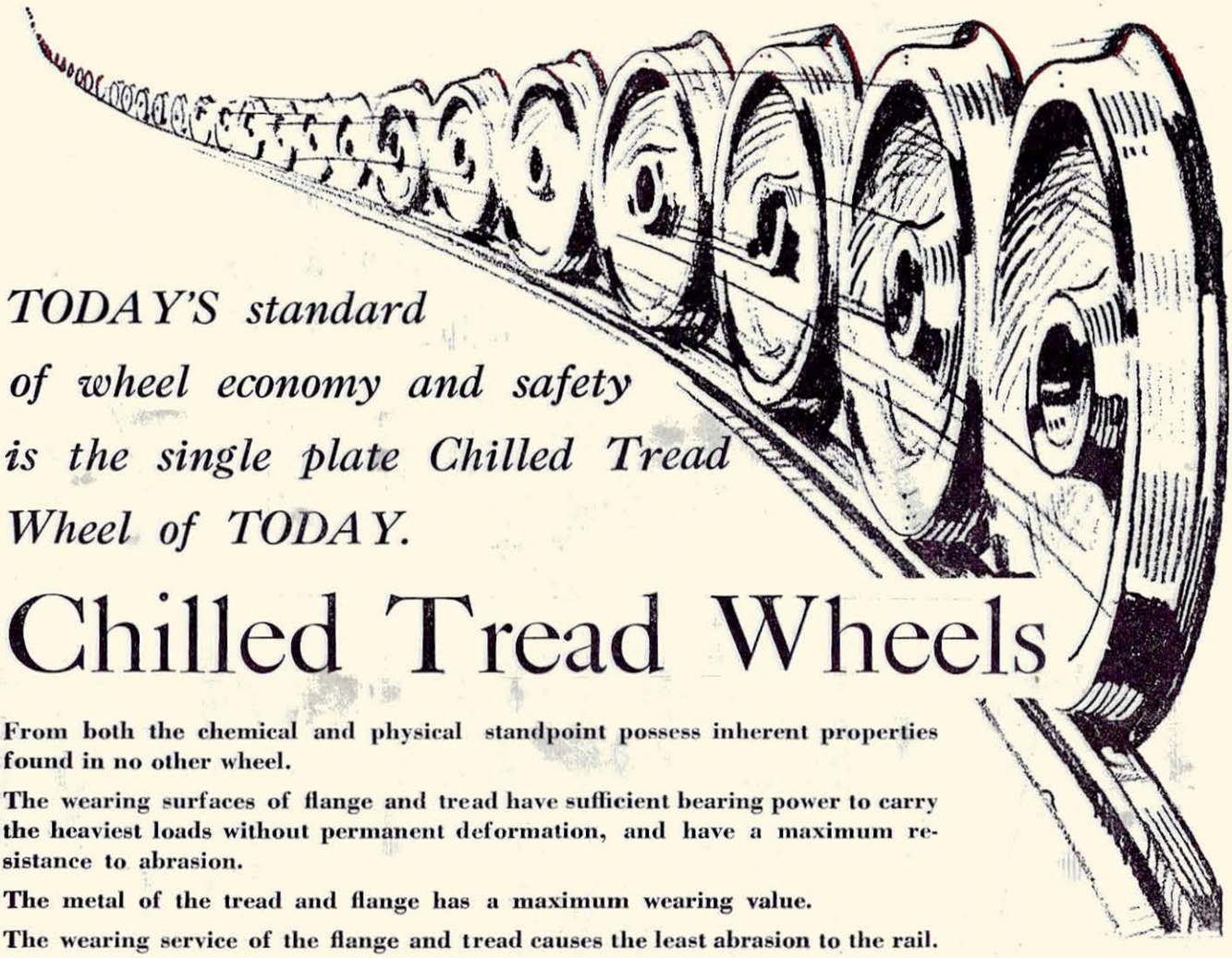
Confidence such as that, built up in years of satisfying contact, is significant to every large consumer of bolting material. If you have any manufacturing problems involving the use of bolting material, you are invited to utilize the experience and facilities of the R B & W Engineering Service. It has solved many interesting problems, including simplification and reduced costs.

RUSSELL, BURDSALL & WARD BOLT & NUT CO.

ROCK FALLS, ILL. PORT CHESTER, N. Y. CORAOPOLIS, PA.

Sales Offices at Philadelphia, Detroit, Chicago, San Francisco, Los Angeles, Seattle, Portland, Ore.

ECONOMY-IS THE WATCHWORD



TODAY'S standard of wheel economy and safety is the single plate Chilled Tread Wheel of TODAY.

Chilled Tread Wheels

From both the chemical and physical standpoint possess inherent properties found in no other wheel.

The wearing surfaces of flange and tread have sufficient bearing power to carry the heaviest loads without permanent deformation, and have a maximum resistance to abrasion.

The metal of the tread and flange has a maximum wearing value.

The wearing service of the flange and tread causes the least abrasion to the rail.

It is easily applied and removed, and requires a minimum of shop appliances.

Annealing practices followed by the manufacturers assures soft plates giving greater resistance to the thermal stresses developed by the most severe brake action, and soft hubs which are easily bored and give minimum mounting cost.

The single plate chilled tread wheel **is another way of saying "*Wheel Economy.*"**

Better Every Year

A slogan and a fact based upon definite laboratory and foundry programs.

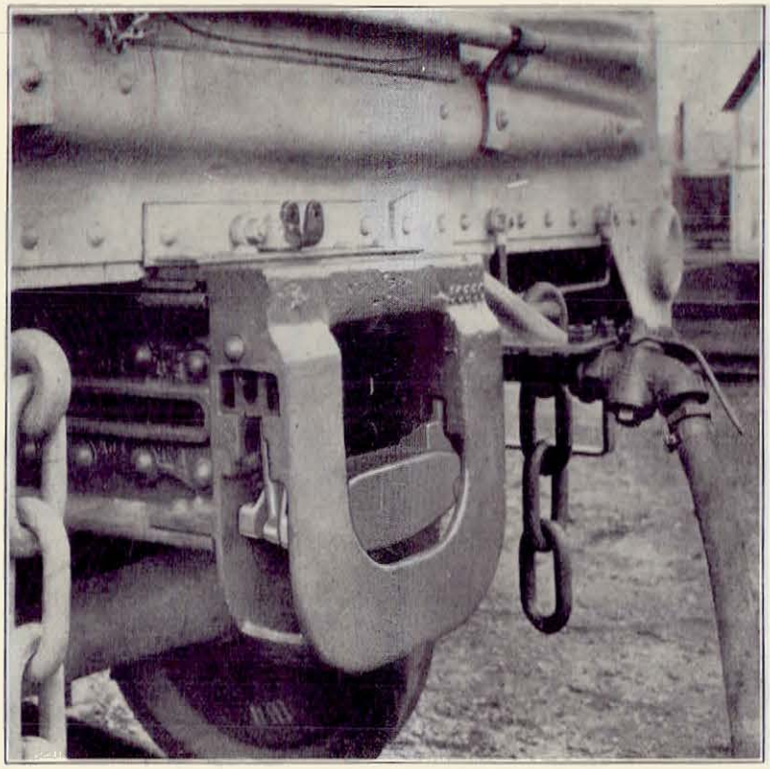
FOR THE 70-TON CAR THE 850-LB. CHILLED TREAD WHEEL—THE HEAVIER THE CAR CAPACITY THE GREATER THE FACTOR OF SAFETY.

CHILLED TREAD WHEELS

A. R. A. Standards

650-lb. for 30-ton Cars—700-lb. for 40-ton Cars—750-lb. for 50-ton Cars—850-lb. Wheel for 70-ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING, CHICAGO, ILLINOIS

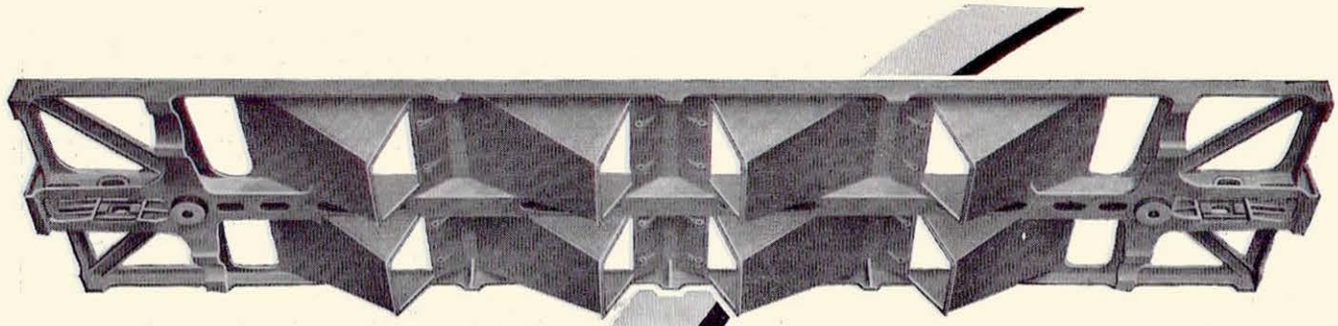


Excess Friction

Sharp flanges and excessive side friction at the rail are very common. Much can be done to relieve this condition by using the Union Centering Device. It eliminates the frictional side thrust of the coupler shank.

UNION METAL PRODUCTS COMPANY

NEW YORK · CHICAGO
ST. LOUIS · WASHINGTON · RICHMOND
SAN FRANCISCO · KANSAS CITY
HOUSTON · MONTREAL



Commonwealth Underframe

One strong unit

ONE PIECE
CAST STEEL
UNDERFRAME
WITH
INTEGRAL
HOPPERS

Provides Increased Strength

Resists Corrosion

Eliminates Repairs and Maintenance

Increases Revenue Car Miles

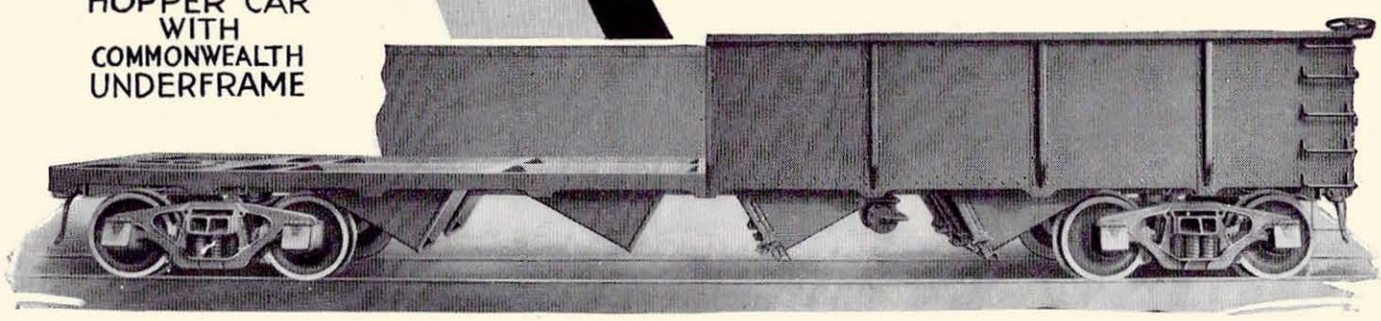
Designed for All Types of Cars

An Excellent Investment

GENERAL STEEL CASTINGS CORP.

GRANITE CITY, ILL. *EDDYSTONE, PENNA.*

HOPPER CAR
WITH
COMMONWEALTH
UNDERFRAME



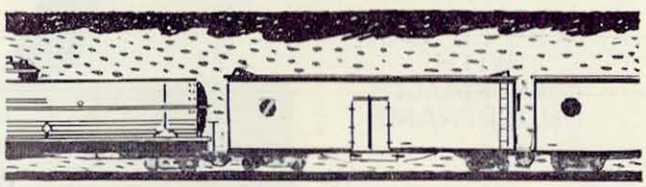
WHALING recently has received a great impetus. Modern chemistry has found ways of using whale oil in the manufacture of soap and candles, as an adulterant for lubricants, and in many other ways.

General American has played an important part in the revival of this old industry. When whale oil arrives in this country it is transferred to inland manufacturers in General American tank cars. The finished products are then transported in other types of General American railroad freight cars to all parts of the country.

This is true of hundreds of other commodities as well as whale oil. More than 750 different products are carried in General American *tank* cars alone. They come from all parts of the world as well as from every section of this country. Whole cargoes from foreign ports are unloaded at the General American public terminal in New Orleans and kept there until they are needed by the manufacturer. Then they are brought to him in General American tank cars. A simple and convenient operation that saves many thousands of dollars.

Many manufacturers have found General American a most efficient aid in reducing transportation costs. From our fleet of 50,000 cars (refrigerator, milk, stock, express refrigerator, and tank) they lease just the cars they need. They save a great initial investment and eliminate all maintenance expense as well as the loss that always results from idle cars.

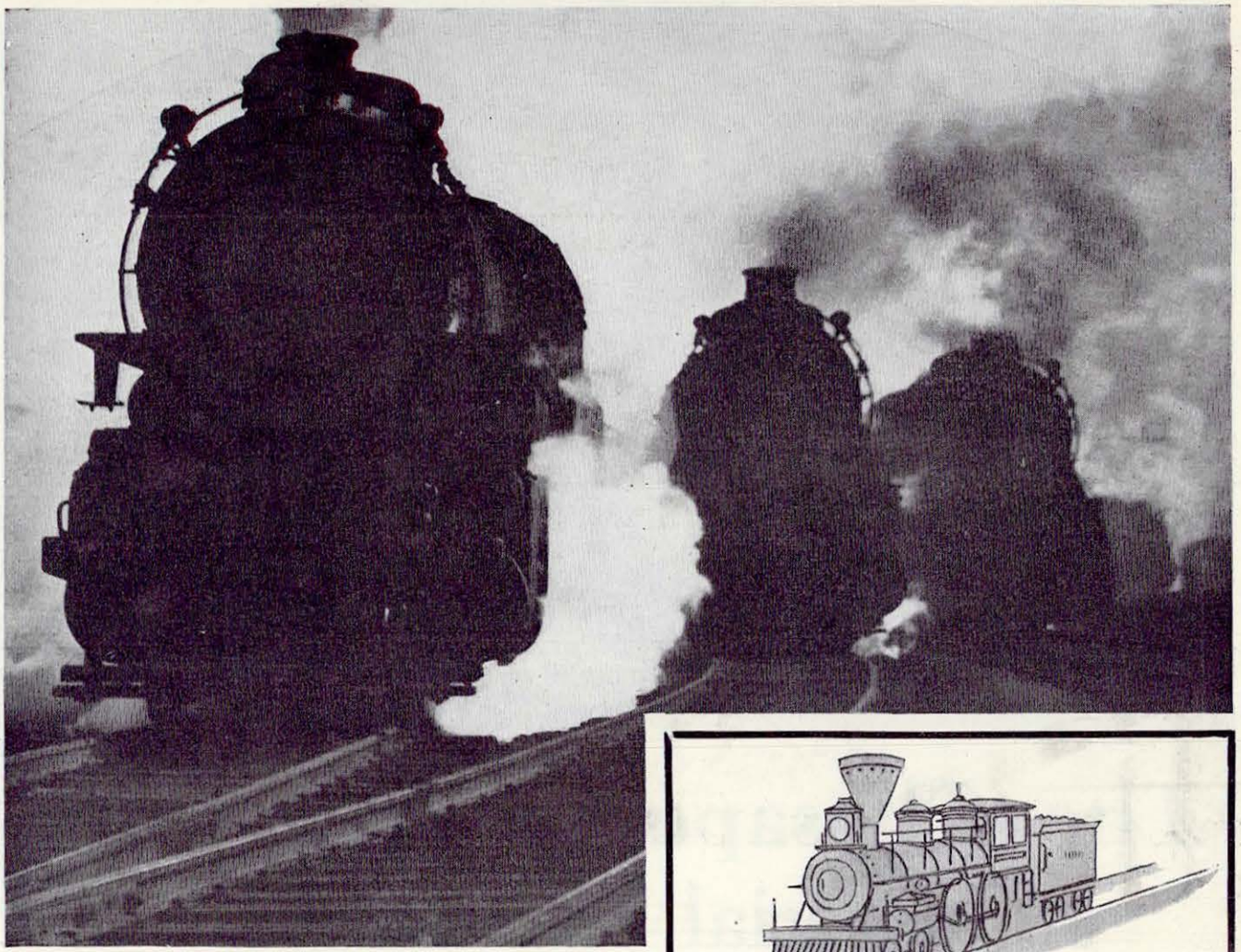
In addition to leasing cars, General American builds all kinds of railroad freight cars. They carry products that range from helium gas to bananas, pigs to caustic soda. There is no kind of car that General American does not or cannot build . . . including the particular car that will carry your product in bulk. *Address Continental Illinois Bank Bldg., Chicago.*

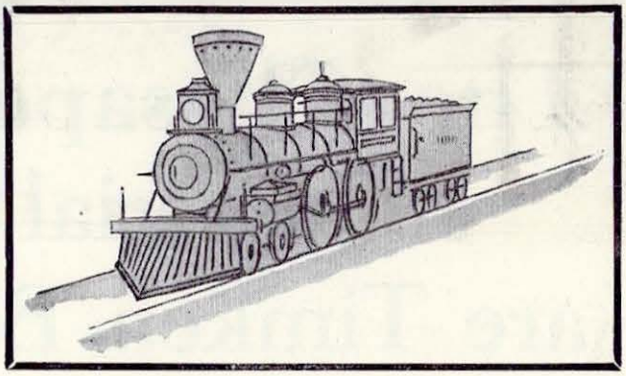


GENERAL AMERICAN TANK CAR CORP.

"A RAILROAD FREIGHT CAR FOR EVERY NEED"

THIS IS ONE OF OUR NATIONAL MAGAZINE ADVERTISEMENTS TELLING PEOPLE THAT A RAILROAD FREIGHT CAR CAN BE BUILT FOR "EVERY NEED."





Just as "Standard" Materials keep on giving economical trouble-free service through the years, so do we keep everlastingly at it—in research, designing and developing to make "Standard" Steel parts even better.

STANDARD STEEL WORKS COMPANY

GENERAL OFFICES & WORKS: BURNHAM, PA.

NEW YORK
CHICAGO
PHILADELPHIA

ST. LOUIS

AKRON
PORTLAND
SAN FRANCISCO

The Chesapeake and Ohio Imperial Salon Cars are Timken Bearing Equipped

Designed to provide a new and more luxurious note of comfort and convenience in modern railroad travel, it was but natural that these superb new cars should be equipped with Timken Bearings. Fifteen cars of this type have been placed in service.

Easy, jerkless starting and smooth, quiet running afford restful enjoyment for passengers. Elimination of hot boxes and lubrication troubles prevents delays and reduces operating charges. No railroad can afford to overlook these advantages.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

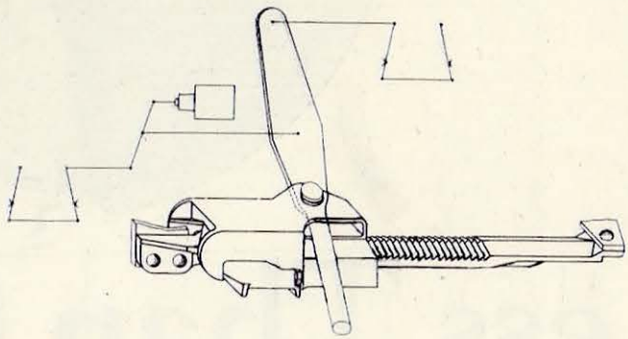
Universal

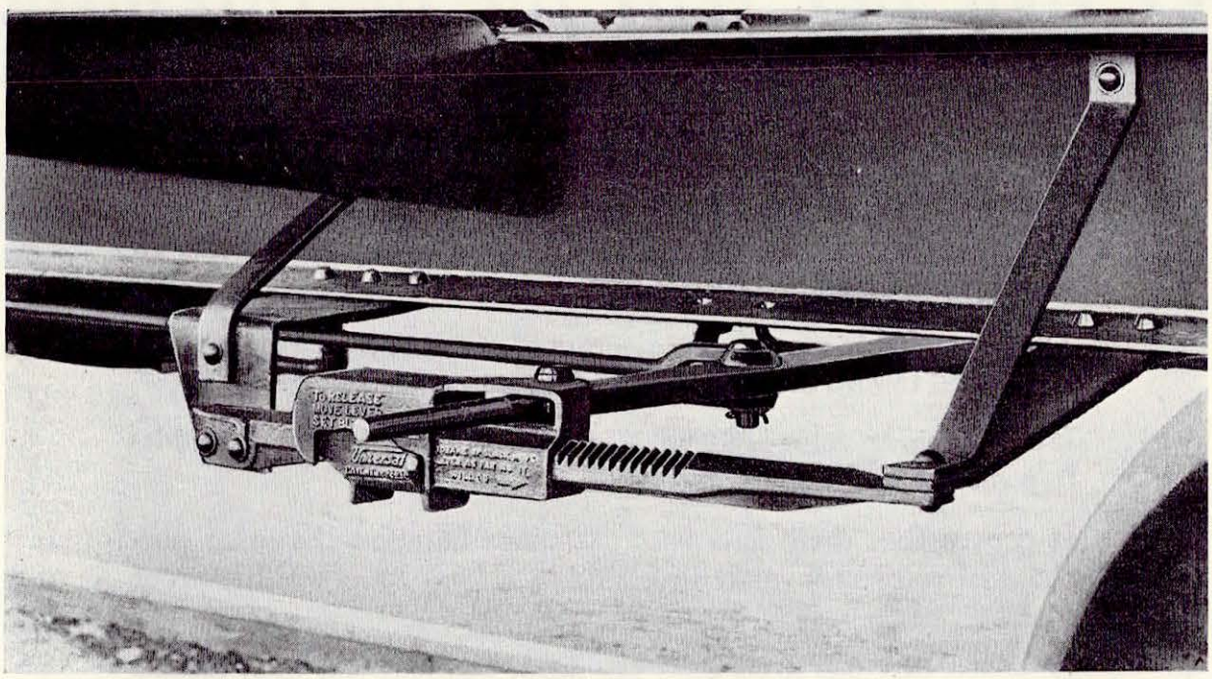
SAFETY—BRAKE ADJUSTER

ELIMINATES DANGER

ONE MOVEMENT ADJUSTS PISTON TRAVEL also BRAKE SHOE CLEARANCE ON ALL WHEELS in FRACTION of a MOMENT WITHOUT GETTING UNDER OR BETWEEN CARS.

TRAINS MOVED
QUICKLY
WITHOUT NEGLECTING
PROPER—SAFE
ADJUSTMENT OF
BRAKES





Universal Draft Gear Attachment Co.

332 So. Michigan Ave., Chicago

Royal Bank Building, Montreal, Canada

Less Than One Cent

per roof per year for maintenance

THE cost of roof maintenance, from 1913 to 1930 inclusive, on 30,000 Canadian National cars equipped with Dry Lading Roofs, amounted to $4,519.49.

The average maintenance cost per roof, per year, during this 18 year period, amounted to less than one cent.

This remarkable record is indicative of efficient management and a deserved reward of far-sighted vision.

It expresses the value of Dry Lading Roofs in terms of long trouble-free service and dollars and cents savings.

It proves that there is a vast difference between the mere purchase of roofs and really investing in a long term weather-proof roof service.

It proves that low price does not mean low cost but long service does. It's the cost per year that counts.

You cannot get around years of actual records. The Universal Dry Lading Roof is the greatest economical improvement in car construction.

Hutchins Car Roofing Company

How the Public Increases Railway Costs

The reasons why the railways imperatively need more revenues are numerous, and include not only the 17 per cent average reduction in their freight rates that has been made since 1921, the loss of traffic due to the depression and the loss of traffic to competing government-aided means of transportation, but, also, increased costs of various kinds that have been and are being forced on them by local, state and national governments.

In the first five months of 1921, which was a year of severe business depression, the taxes of the railways were $110,000,000, or 5 per cent of their gross earnings. In the first five months of 1931, another year of severe depression, the gross earnings of the railways were 18 per cent less than in the first five months of 1921, but their taxes were 25 per cent greater, or $137,000,000, and amounted to 7½ per cent of their gross earnings. This increase from 5 per cent of gross earnings in 1921 to 7½ per cent of gross earnings in 1931 means that, relatively to their gross earnings, the taxes of the railways are 50 per cent greater now than ten years ago.

Railway taxes are paid to help defray the cost of government, which is constantly and rapidly increasing. Does the public believe that the railways or any other industry can go on forever paying rapidly increasing taxes from declining earnings? In the first five months of 1931 taxes were 73 per cent as great as the net operating income earned from which to pay a return upon the entire railway investment.

Some Demands from Chicago

An engineer employed by the city council of Chicago made a report last week urging the construction of two new union passenger terminals in that city at a cost which he estimated would be from $20,000,000 to $25,000,000. His estimate of cost is ridiculously low. Whatever the cost would be, however, it would be added to the investment in the railroads, and would correspondingly increase the fixed charges that they must pay from their earnings. Why were this report and recommendation made by a city employee? Why is the Chicago council considering appealing to the Interstate Commerce Commission to compel the railroads to make the proposed expenditure? Obviously, because it would be made for the benefit of the people of Chicago, and not for the benefit of the railroads. Of what other industry is it demanded, either in Chicago or elsewhere, that it shall make large investments which will have no tendency to increase the earnings from which it must pay a return upon investment? How long will the public continue to believe that it can compel increases in the cost of furnishing railway service without making it necessary for it to pay higher rates for the service?

Although Chicago is asking the railways largely to increase their investment for its benefit, it is a leader in advocating inland waterway development and other government policies that tend to reduce railway earnings. For example, the business interests of the Chicago district are preparing to demand that the federal government shall make an "improvement" which would force the railways to make large expenditures for the express purpose of helping create a competing means of transportation to take traffic and earnings from them. The Sag channel extends from Lake Calumet, in an industrial part of the Chicago district, to the Chicago drainage canal. A board of United States Army Engineers, on the initiative of Chicago business interests, is studying the feasibility and desirability of deepening this channel to 9 ft. and widening it to 200 ft. at all points for the purpose of making it a link connecting the Great Lakes and the Mississippi valley waterway system. The result would be to make it necessary to reconstruct most, if not all, of the seventeen railroad bridges by which the Sag channel is now spanned at a cost of many millions of dollars. The purpose would be to provide "cheap" water transportation, but apparently, under existing laws, the railways would be forced to bear the cost of reconstructing these bridges. In other words, they would be forced to increase the cost of rendering their service in order to help reduce the rates that shippers would have to pay for transportation by water. When did it become fair or economically sound for a government to force business concerns to increase their fixed charges in order to help competitors to take business from them?

In every part of the country where inland waterways are being developed their development is making, or will make, it necessary to reconstruct at great expense not only many railway bridges, but also many

highway bridges. This is one of the numerous concealed costs of inland water transportation to which public attention has hardly been called in the past, but which the public finally must pay in freight rates or in taxes.

Cost of Grade Separation

The extensive construction of hard surface highways and the great increase in their use by motor vehicles have caused a corresponding increase in the demand for the elimination of grade crossings of highways and the great increase in their use by motor the *Railway Age* of January 3, page 24, it was estimated, on the basis of information furnished by a large number of roads, that the total outlay of all the railways for the separation of grades in 1931 will be $100,000,000. Annual interest on this at 5 per cent will be $5,000,000, and the saving in operating expenses resulting from grade separations will contribute very little toward paying this increase in fixed charges.

A report made at the last convention of the National Association of Railroad and Utilities Commissioners showed that in three states the railways pay 33 per cent of the cost of grade separations; in one state, 40 per cent or more; in three, 50 per cent or less; in eleven, approximately 50 per cent; in five, 50 per cent or more; in two, 65 per cent; in one, virtually all of the cost, while in 18 others there is no general rule of apportionment. Obviously the present need for separation of grades and the adoption of other means of increasing safety at highway crossings has been created almost entirely by the increase in highway traffic. Operators of buses and trucks use the highways for transportation for hire without being made to share with the local and state governments the cost of grade separations. Why, then should so large a part of this cost be imposed upon the railways? The effect of dividing the cost between the railways and the taxpayers is to increase the cost of transportation by rail and reduce the cost of transportation by highway; and then persons who hold themselves out as spokesmen of the public ask why the railways do not compete more successfully with highway carriers.

Productive and Unproductive Investments

The public is grinding the railways between the upper millstone of increased costs and the nether millstone of reduced earnings. The investment in the railroads has increased about $6,000,000,000 within the last ten years. A large part of this investment has been made to effect economies in operation, and, that it has been made wisely is shown by the fact that in 1931, a year of depression, operating expenses are running at the rate of over a billion dollars less than in 1921, also a year of depression. A large part of the increased investment also has been made, however, in new passenger terminals, separation of grades, the reconstruction of bridges to aid waterways and other improvements which increase fixed charges without increasing earnings or reducing operating expenses. Because of these unproductive investments, of increases in taxes and of losses of earnings, the railways find themselves, after all the huge economies they have effected during the last decade, making a return this year of only 2 per cent, or less than they made in 1921, which until 1931 was the worst year financially in their history.

The application for a general advance in rates should forcibly remind the public that there is a limit to the economies the railways can make with which to offset both increases in their fixed charges and reductions of their earnings, and that if it wants low railway rates it will have to quit following policies that simultaneously increase railways costs and reduce railway traffic.

Indiana Commission Recognizes Value of Railways

Is somewhat greater convenience in freight transportation service as important to the public as the welfare of the railways, including the ability of the railways to pay taxes that the public needs? This question is answered with an emphatic negative by the Public Service Commission of Indiana in a decision denying the application of a truck operator for a certificate to permit the operation of motor trucks in competition with the Pennsylvania between certain points in that state. In acting upon this application the commission took into consideration the importance of the taxes paid by the railways to the communities affected—perhaps the first time that the matter of railway taxes has been such an important factor in the deciding of a case of this kind. In its decision, the commission said:

The commission realizes that store door delivery is somewhat convenient in the transportation and delivery of cargo property. However, the commission wishes to work for the welfare of the community as a whole, and must bear in mind all elements affecting that welfare—especially the subject of taxation, in which every citizen is vitally interested. It must not be forgotten that the benefit derived by a community from taxes paid by the railroads is a matter of no little concern.

It is very evident that in this case the applicant and the railroad, operating in the same territory, cannot both survive. Which of the two should remain? The community as a whole is better served by the railroad than by the truck. Motor trucks pay no taxes in comparison with railroads. For the year 1929, the Pennsylvania Railroad paid in taxes in the counties of Randolph, Jay, and Adams the sum of $179,677.16. The population of these counties by the 1930 census is 65,662. On a per capita basis, the railroad pays $2.73 per year for every man, woman, and child in these three counties. The railroad serving this territory was assessed at the sum of $38,332 per mile for the year 1929, which amount includes main and side track, rolling stock and improvements, but not the local assessment. It must not be forgotten that this assessed value is distributed in every taxing unit where property of the railroad is located. In regard to the operation of trucks over the public highways, for the year 1929, the average maintenance cost per mile on the various types of highways was $564. For the year 1930, the average maintenance cost per mile was $605, or an increase over 1929 of $41 per mile, brought about largely by the operation of heavy trucks.

No expense of this kind can be attributed to the railroads....

The railroads in this country are paying in taxes approximately one million dollars a day, and this vast amount of money is distributed so uniformly throughout the country that it benefits every man, woman, and child. A part of this money was spent for road building, long before the motor vehicle was used; and these very roads are now being used as the

foundation for our present cement or hard-surfaced roads. In other words, part of the tax paid by the railroads has been used against them through the use of the highways by competitive motor operators. As the gross and net revenues of the railroads decrease, the assessment of railroad property will decrease and the amount of taxes paid by the railroads will be reduced. This means but one thing—an increased rate for every taxpayer, whose property, in many cases, has already been assessed at its true cash value. . . . .

The commission is of the opinion that the right of an existing public utility to have the support of public patronage in return for its contribution in the way of public service and taxes paid in support of the government, state and local, compared with the right of a new utility which seeks to render the same or similar service in the same territory, to the detriment of the existing utility, is a factor of no small consequence; and that the general public, as well as the existing utility, has a right to have the subject of taxes considered in determining the fundamental question in such cases, viz: Do public convenience and public necessity require such new competing service, and is such competing service warranted by public policy?

In the opinion of the Indiana Commission, public convenience and necessity in transportation involve more than a mere additional delivery or so each day. Possibly other commissions can be persuaded to view the matter in the same light. In its decision, the Indiana commission is protecting the railroad not nearly so much as it is protecting the public.

The Present and Future of the Railways

Both the immediate future and the more distant future of the railways must be considered. They are confronted at present with a serious emergency. They made very large economies in operation in the nine years ending with 1929. They have effected great retrenchments during the last 18 months, especially during the last year. Nevertheless, they have been earning a return upon their investment thus far in 1931 at the rate of only 2 per cent. Making permanent economies requires time, and there is not enough time in which to make permanent economies to meet the present emergency. It can be met only by an early substantial increase in traffic, or an early advance in rates. No perceptible improvement in traffic is occurring. Therefore, an early general advance in rates seems to be the only feasible means of preventing disaster to many railways.

Sooner or later, however, general business will revive. The managements will then have to deal not with a pressing emergency, but with problems involving the entire future of the railways. The safeguarding of their future, from the standpoint both of investors in securities and of the traveling and shipping public, will require many things. These will include, changes in government policies that will give the railways fair treatment as compared with other means of transportation; regulation of rates that will enable them to earn a fair return, and economies in operation that will make it possible to render good service at the lowest practicable reduced cost.

There is no inconsistency to the policy of the *Railway Age* in supporting the pending application of the railways for an advance in freight rates, and at the same time beginning the publication of a series of articles regarding means by which permanent economies in operation can be effected in future. Some savings might be made at the present time by reducing competition in passenger service and changing other competitive practices, but these savings would be very small as compared with the increase in revenues immediately needed. The present emergency must be met by such means as are immediately available. At the same time, however, there should be intensive studying and planning for the future. Under the policy of drastic retrenchment now prevailing deferred maintenance is rapidly accumulating. The railways must be better maintained in future. The resumption of adequate maintenance will tend to cause a large increase in operating expenses, and real economies will have to be effected in every practicable way if the unit cost of service is to be made as low as it should be.

The Interstate Commerce Commission has a responsibility for the economy of railway operation which it has never seemed to recognize. Under Section 15-A of the Transportation act the right of the railways to such regulation of their rates as will enable them to earn a fair return is conditioned upon efficient, economical and honest management. But the amount of return earned, and the extent to which operation can be made efficient and economical, are inter-dependent. The largest economies in operation always have been and always will be accomplished by improvements in facilities that make it practicable to use less labor, fuel and materials in producing a given amount of transportation. Such improvements cannot be made without the investment of new capital, and the extent to which they can be made depends upon the amount of new capital that can be raised for that purpose. Consequently, for the commission, upon the ground that the railways were not operated with the maximum possible economy, to so restrict their return that they could not raise needed capital, would be to prevent the making of improvements required for the most economical operation practicable.

The primary responsibility for economical and efficient operation rests upon railway managements. To demand, however, that they should give a 100 per cent performance in meeting this responsibility would be entirely unreasonable. There is not, and never will be, an approach to 100 per cent performance in the conduct of any industry or government. The managements can show that they have in the past complied reasonably with the requirement of economical and efficient operation, and as long as they can do this the Interstate Commerce Commission should assume its responsibility of enabling them to earn returns sufficient for raising of all the capital that can be used in effecting the greatest practicable economies.

Both the commission and the managements have their responsibility for the future of the railways. All the economies in operation practicable will be effected only if both meet this responsibility.

Better Water Stations Will Save Money

Modern automatic pumping plants and adequate provision for treatment will produce suitable supplies for less money and reduce cost of train operation

The Station Agent Starts the Pump, A Means of Economy in Water Supply

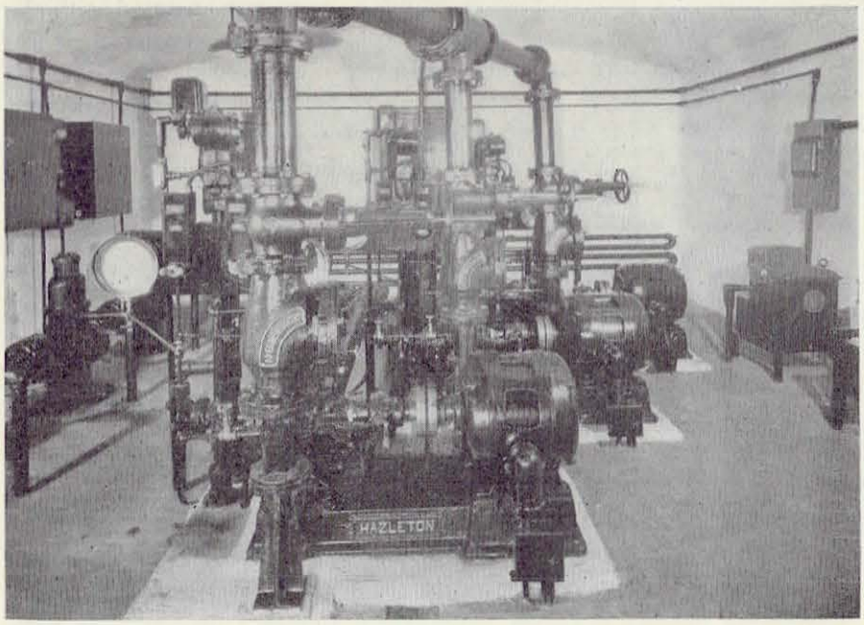
PUMPING plants that will deliver water at a lower cost per gallon, water stations so located as to reduce the delay to trains in taking water, and treating facilities that will insure that all water taken into boilers is of a character that will minimize boiler and firebox maintenance, present outstanding opportunities for economies in railway operation. It is true that marked improvements in water supply have been made in the last 15 years, but it is only within that period that water service has assumed the status of an established sub-department on any considerable number of American railways. The development in this field is so recent, it has not been promoted with equal effectiveness on all properties, and the advance in the art is so rapid that new opportunities for improvements and economy are constantly being presented. As a consequence, the railways as a whole have not yet had time to avail themselves of all of the possibilities for reducing operating costs that are offered in this field.

A potent influence that will insure greater progress in the future is the change in attitude toward water service. Whereas the policy of the past was to develop a given source of supply for the least money, the objective today is to provide an adequate supply of water of suitable quality at the lowest cost per gallon consistent with the delivery of the water to locomotives with the greatest convenience and economy from the standpoint of train operation. This is the key to further savings in the administration of railway water supply.

Adequate Survey Necessary

To effect any comprehensive results on this basis it is necessary to approach the problem, as has been done by a number of railways, by studying water supply from the standpoint of an entire engine district. The Norfolk & Western, for example, is carrying out a program for the development of a limited number of water stations at suitably spaced locations, where adequate supplies of the desired quality of water are available, and abandoning all the others. This plan, together with the use of larger engine tanks, will result in an appreciable reduction in the number of stops for water. And also, because the new plants are fewer in number, larger, and better equipped and constructed, there will be less expense for attendance and maintenance, supervision will be simplified and the cost per gallon of water delivered will be lower. The adoption of this procedure also promises other returns. General investigations often lead to the discovery of better water supplies that were previously overlooked, whereas if attention is directed solely to the requirements of a single existing facility, the natural tendency is to approach the problem exclusively from the standpoint of the possible improvement in the source of supply then in use.

Probably the greatest opportunity for economy in water service lies in the modernizing of the pumping equipment. While the first step in this direction consisted in the replac-



A Modern Station Reduces Cost of Pumping Water

ing of the primitive steam-driven pumps with gasoline-engine or electric-motor driven units, there are still many steam plants that have outlived their usefulness. Because of lower thermal efficiency, the need for constant attendance, the fire hazard, and the expense of fuel delivery, they are much more costly in operation than plants operated by other types of power units. But the need for replacement does not end with the elimination of steam plants. Many of the older gasoline-engine driven units are now nearly as obsolete as the steam plants, because of the greater economy of the diesel or semi-diesel engine.

Because of the extension of public service power transmission systems, electric current is now available at many more stations and frequently at rates which make electricity cheaper than any other source of power, with the further advantage of its adaptability to remote or automatic control. Apparatus for this purpose is now so reliable that electrical pumping plants can be operated with no attendance other than an occasional visit for lubrication and inspection.

An example of what can be accomplished by a careful study of the water supply facilities, is afforded by the results obtained on one engine district of a middle western railway. Water at six stations was delivered by steam plants, one of which required the service of two pumpers. Three others were operated by a crossing watchman, a telegraph operator and a baggageman, respectively, and the remaining two were operated with steam obtained from engine terminals. Automatic electric pumps were installed at five of these plants and the sixth was abandoned. As the need for the crossing watchman was obviated by the installation of automatic crossing protection, and it was found possible to dispense with the operator and the baggageman at the two other stations, the change in power resulted in the elimination of five men. In addition, the development of a new source of supply at a seventh station, where water had been obtained from city mains, resulted in a saving of $5,000 per year.

Greater Choice of Supplies

Electric plants have a further advantage in that because fuel deliveries are unnecessary, the plants can be operated with equal economy at points remote from the railway line, and this permits of a greater latitude in developing available sources of water supply. At Galesburg, Ill., the Burlington and the Santa Fe obtain water from reservoirs located 3½ miles and 4 miles, respectively, from their tracks. The Santa Fe plant receives no attention other than a fortnightly visit by a water service man, and the cost of pumping water is less than half that of supplying water at the plant previously in service, while the quality of the water is so far superior that the treating plant operated to treat water from the old source is no longer used.

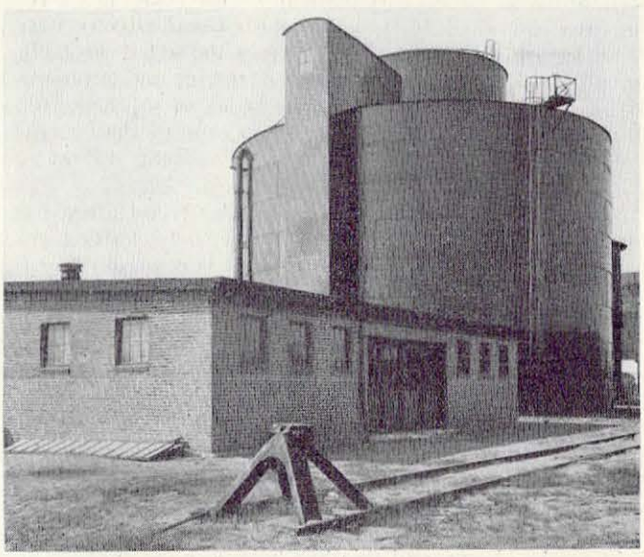
Where oil or gasoline power is used, and some attendance is necessary and delivery lines are of ample size, savings may be effected by providing pumping units and storage tanks of sufficient size so that the water required for a 24-hr. period may be pumped in one shift instead of two or even three.

There are also opportunities for reductions in pumping expenses in the replacement of pipe lines. Old pipe lines become inadequate for two reasons—an increase in the volume of water that must be delivered through them, and increased roughness or loss of effective diameter as a consequence of incrustation. Both produce increased frictional resistance of the pipe line and a consequent increase in the power required to deliver a given quantity of water. For example, the power required to overcome the friction in 2,000 ft. of 8-in. pipe 20 years old, delivering 1,000 gal. per min., amounts to about 17 hp., whereas that for a new 10-in. pipe is only about 3 hp. or a saving of approximately 14 hp., the capitalized cost of which can readily be compared with the cost of a new pipe line.

Similarly the economy of pipe line construction can be determined in cases where the new line will be effective in reducing train service expense. Extensions, for example, that will permit locomotives to take water without the need of cutting trains at street or highway crossings can readily be evaluated.

Lower Maintenance Expenses

The savings that may be made through improved water supply plants are not limited to those that result from lower power and attendance expenses. Much can be done to reduce the cost of providing locomotive boiler water by the installation of plant facilities of such design and construction as to avoid the excessive maintenance expenses which attend the operation of existing equipment. Makeshift intakes lead to excessive expenditures for the removal of drift, the cleaning out of clogged intake pipes, and wear of pumps. The substitution of centrifugal pumps or air lifts under conditions suitable to their use will eliminate most of the high maintenance expense that attends the use of reciprocating pumps for water containing sand. A change to centrifugal pumps in connection with improvements in the water supply facilities of the Chesapeake & Ohio at Stevens, Ky., made it possible to dispense with the services of a water service repair gang which had previously been engaged almost continuously in overhauling the triplex plunger pumps in service at that place. On the Rock Island at Silvis, Ill., a moving intake screen not only insures that the river water taken into the pump is free from drift and debris, but eliminates the cost of the labor formerly required to clean the intake well several times a year.



This Plant Treats at the Rate of 150,000 Gal. Per Hr. Water That Was Used Untreated Only 18 Months Ago

Saving Money By Water Treatment

No railway has exhausted the possibilities offered in the field of water treatment. Some roads lag far behind the progress already made by others, but even those

which have realized outstanding operating economies as the result of water conditioning are constantly being confronted with the fact that further improvements can be made. Why this is true can be readily explained.

The treatment of locomotive boiler waters under more or less definite chemical control, dates back about 30 years, but in the early days water softening, whether effected by the use of boiler compounds or in roadside

	Sodium Aluminate	Lime-Soda ash	Soda Ash	All Plants
No. of plants	100	63	14	177
Water treated, M gal.	1,146,292	3,283,297	198,469	4,628,058
Water Treated per plant, M gal.	11,463	52,116	14,176	26,147
Solids Removed—lb.	1,211,300	8,809,600	125,800	10,146,700
Solids Removed—lb. per plant	12,100	139,800	8,950	57,300
Cost of Treatment	$47,767	$180,590	$4,928	$233,285
Cost of Treatment per plant	$478	$2,870	$352	$1,318
Gross Savings	$157,476	$1,145,242	$16,357	$1,319,075
Gross Savings per plant	$1,574	$18,160	$1,169	$7,450
Net Savings	$109,709	$964,652	$11,429	$1,085,790
Net Savings per plant	$1,097	$15,300	$815	$6,130
Gross Saving Per M gal.	$0.138	$0.338	$0.082	$0.285
Cost of Treatment per 1,000 gal.	$0.042	$0.055	$0.025	$0.05
Net Saving per M gal. of water	$0.096	$0.283	$0.057	$0.235
Cost of Plants	$10,835	$1,039,611	$3,692	$1,054,138
Av. Cost of plant	$108	$16,502	$264	$5,950

treating plants, was applied only to those waters which were the cause of serious difficulties. True, the results obtained were frequently expressed as savings effected through reduced locomotive maintenance, the elimination of engine failures, fuel economies, etc., but in general it was the opinion of railway managements that water treatment was warranted only in territories where the ill effects of hard water were especially severe. It was not until 1924, when the Committee on Water Service of the A. R. E. A., after extended study, arrived at 13 cents per pound of encrusting solids removed from boiler feed water, as a measure of the benefits of water treatment, that the real opportunities came to be realized.

This development had two significant effects on water treating practice. One is the growing trend toward the treatment of waters which were formerly deemed good enough for use without treatment. Whereas, 13 grains of encrustants per gallon was once considered the minimum content justifying treatment, it has been shown that waters containing as little as 6 or 7 grains can be treated with results that will show a definite return. Another effect was to show that it pays to obtain greater refinement in treatment, whereby water with a residual hardness of only 1.5 to 2 grains per gallon is obtained, whereas 5 or 6 grains was once deemed a thoroughly commendable performance. A type of chemical treatment is now available which reduces water to a state of zero hardness, and this has been applied successfully in a number of railway installations.

Opportunities for Further Improvement

Another change in the attitude toward water treatment is the growing conviction that it pays to treat all waters delivered to locomotives rather than only the waters containing the greatest load of dissolved solids, or those used in the largest amounts. With this change of position, there is developing a different attitude toward the relative merits of roadside treatment and boiler compounds. Whereas, these were once deemed distinctly competitive, they are now considered complementary, with the idea that each has its place in the program of water conditioning. In accord with this thought, several manufacturers of boiler compounds, in addition to making appreciable improvement in their products and in their facilities for chemical control, are now offering equipment for roadside treatment as well. There are now available, therefore, types of equipment and processes of treatment which are suitable for the solution of almost any problem of water conditioning.

There is also a wide field for economies in the operation of treating plants. Thanks to the perfection of automatic proportioning apparatus, the modern water softening plant can be operated without manual attendance other than routine inspection and the recharging of the chemical mixing vats. Not only are the chemicals fed into the treating tank in correct proportion to the flow of raw water, but the delivery of raw water is controlled by float-valves. A plant of this type with a capacity of 150,000 gal. of water per hour, built by the New York Central at Elkhart, Ind., at a cost of about $70,000, is estimated to effect an annual net saving equal to the investment.

An Object Lesson in Water Treatment

An excellent demonstration of the savings that can be made by the treatment of locomotive boiler water is afforded by a statement prepared by Paul M. LaBach, engineer of water service of the Chicago, Rock Island & Pacific, summarizing the operation of 177 treating plants on that road during 1930. This railway treated 4,628,058,000 gal. of water in these plants last year at an operating cost of $233,285 (for labor and materials), or an average of about five cents per 1,000 gal. and thereby removed 10,146,700 lb. of encrusting solids from the water. Applying the unit saving set up by the Water Service committee of the A. R. E. A. of 13 cents per lb., this amounts to an estimated saving in train operation and in boiler and firebox maintenance of $1,319,075, or an operating saving of $1,085,790, effected with a plant investment of $1,054,138, while if 25 per cent is assumed for interest, depreciation and maintenance of the plants, the net saving amounts to about $791,000 per year.

Owing to the fact that the operating results were segregated by individual plants, it is possible to analyze the performance of the plants by types. Of the 177 plants, 63 are either continuous or intermittent lime-soda ash plants effecting complete treatment, i.e., to an after hardness of 1.5 to 2.0 grains per gallon. Partial treatment is carried out in 114 plants, of which 100 are sodium-aluminate plants and 14 are soda-ash plants. These plants are located at points of smaller consumption or where the water is of limited hardness, although some of the sodium-aluminate plants treat a large volume of water. A complete analysis of the performance of the three classes of plants is given in the table, which is based on the assumption that the saving per pound of encrust-

In Next Week's Issue

Highway competition for railway passenger traffic has reduced the revenues of many local passenger trains to the vanishing point. Unable to secure an adequate volume of traffic in the face of this competition, and unable to reduce their passenger service adequately, the railways' urgent need is a means of providing passenger service at the lowest possible cost. In next week's issue, we shall describe how many of them are finding the answer to this problem to be the motor coach.

ants removed is the same for partial treatment as for complete treatment.

Conclusion

In conclusion, the opportunities for economy in supplying locomotive boiler water lie in studies of water supplies from the standpoint of the engine district rather than the individual plant, for the purpose of developing a limited number of sources of water with due regard to quantity and quality available, a desired spacing of water stations and the delivery of the water at points most favorable from the standpoint of operation, the replacement of obsolete pumping equipment with equipment designed to effect reductions in operating and maintenance costs, the application of automatic or remote control for the purpose of reducing the expense for attendance, the application of treating processes to all waters that do not meet present standards of water quality, and a program for water treating plant construction or reconstruction for the purpose of obtaining automatic operation.

Porter Gas-Electric Locomotive for the C. B. & Q.

IN November, 1930, the Chicago, Burlington & Quincy received a 45-ton, 330-hp., gas-electric locomotive from the H. K. Porter Company, Pittsburgh, Pa., and placed it in light yard-switching service at Crete, Neb., where it has since been giving reliable and economical service. The primary object of purchasing this locomotive was to provide switching service to industrial tracks at Crete without the expense of assigning a full-time steam switching locomotive and crew to the job, or delaying local freights while the switching was done by road locomotives and crews. This objective has been fully achieved and, as shown in one of the attached tables, the yard switching cost at Crete has been cut from $55.37 a day with steam operation to $21.06 a day with gas-electric, excluding interest and depreciation charges. Another table shows a cut of nearly 50 per cent in cost in favor of the gas-electric in a nine-hour comparative test run in local freight service from Keokuk, Iowa, to Mt. Pleasant and return.

As indicated, the Porter gas-electric locomotive is designed primarily for switching service. Its weight of 45 tons is all available on the eight drivers, and the length of the wheel base and truck design permit operation on sharp curves with minimum flange wear. One of the principal features in the design of the locomotive is the clear visibility for the operator. Windows are provided entirely around the cab which is centrally located and raised in such a way that the operator can see across, forward and backward over the low sloping engine hoods. Control stations are located near together at diagonally opposite corners of the cab, and this fact, combined with fine visibility and the dead man's control feature, make one-man operation practicable, convenient and safe. The cab is equipped with a minimum number of valves, relays, thermostats and other devices which would require the attention of the operator. Enough meters, gages, temperature indicators, etc., are included, however, to permit operating the locomotive with the necessary knowledge of working conditions.

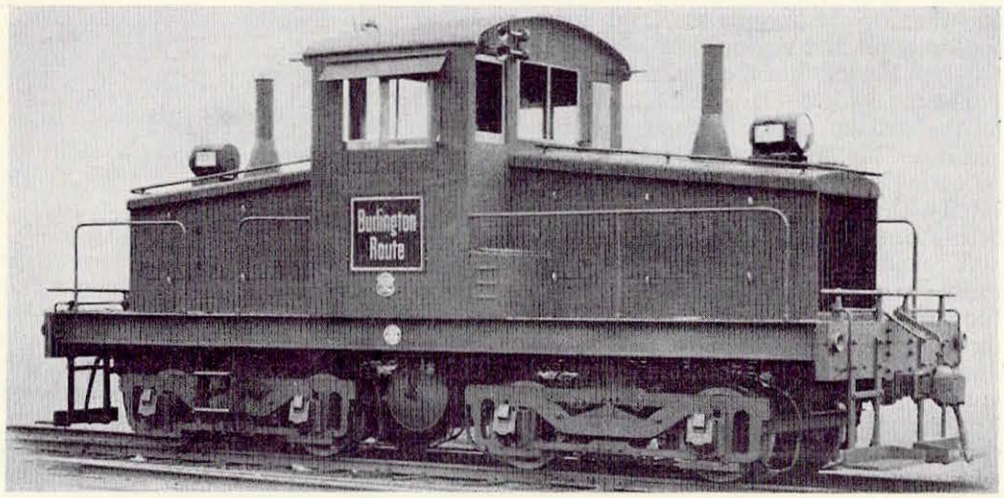
The General Dimensions of the Porter Gas-Electric Locomotive

Weight on drivers	90,000 lb.
Size of drivers	33 in.
Factor of adhesion	3.57
Total wheelbase	20 ft. 6 in.
Rigid wheelbase	6 ft. 6 in.
Length over bumper	29 ft. 3 in.
Width	10 ft. 0 in.
Height overall	14 ft. 10 in.
Starting tractive effort	25,200 lb.

Motive power is furnished by two 165-hp. Climax Blue Streak gasoline engines which provide 7½ hp. per ton of locomotive weight. These engines have six cylinders each, with 6-in. bore and 7-in. stroke, and run at 1200 r.p.m., when operating under the control of a top-speed governor. For operation at slower speeds as when accelerating the locomotive, they are throttled down, the necessary throttle adjustment being obtained by means of an electro-pneumatic device operated from the speed-control handle in the cab. The throttle-operating devices are used to eliminate complicated and unwieldly mechanical connections and to enable the engines to be adjusted independently and yet permit them to operate in synchronism when below governed speed.

The engine cooling system consists of a vertical radiator at the front of each engine, a pump driven by the engine, and a large propellor-type fan mounted at the front of each engine and driven by it. Shutters resembling the conventional Winter-front are provided for cold-weather operation.

Westinghouse electrical equipment is used throughout and consists of the following: At the flywheel end of each engine and driven from it by means of a flexible coupling is a 500-volt railway-type generator. This

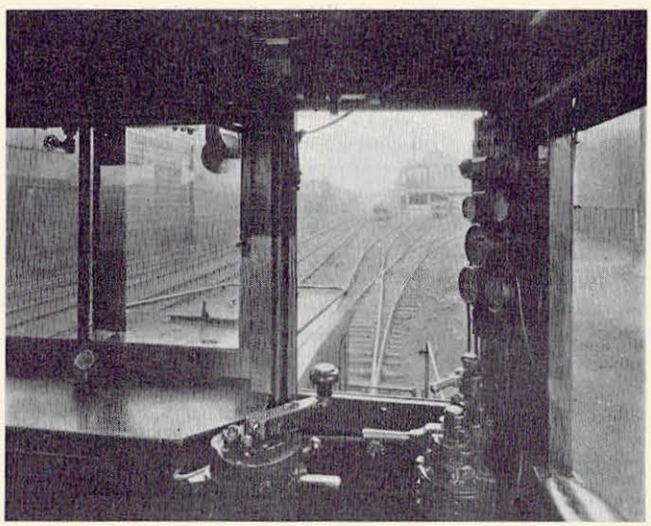


Porter 45-ton Gas-Electric Locomotive Powered by Two 165-hp. Climax Blue Streak Engines Recently Delivered to the Chicago, Burlington & Quincy

generator is provided with a shunt-field winding which is set to load the engine properly under normal conditions and thus prevent the engine from stalling or being pulled down in speed. As such a generator will have a drooping characteristic resistance, steps are provided in the field circuit so that the voltage may be boosted at light loads to obtain higher locomotive speeds. In other words the engine power curve may be matched at the discretion of the operator by moving his controller handle to the necessary points.

The generator is also provided with a series winding which is used for cranking the engine and which acts as a differential winding when charging the battery from the main generator during idling periods. When cranking, the generator acts as a series motor running off the storage battery. A special winding is also provided to insure good commutation at all times.

Each generator supplies current to two 75-hp., 500-volt traction motors which are connected to it in series when the locomotive starts and are re-connected in parallel through a closed circuit transition after the engines have come up to full speed with the throttles wide open. This method of control is used to give a smooth and flexible application of power during acceleration at high



The Clear Visibility Provided for the Operator is One of the Features of the Locomotive

tractive efforts and a smooth change over to the high-speed motor connection without total loss of drawbar pull while making the change. Once the motors have been connected in parallel they will remain so connected and the engines may be throttled down, reducing fuel consumption and engine duty where full output is not required to maintain the desired locomotive speed.

The motors are self-ventilated and are geared directly to the driving axles through single-reduction helical gearing. Motors are axle-hung with noses suspended by spring retained links. The axle bearings are lubricated with oil and waste while the armature is fitted with ball bearings.

A feature of the locomotive is the arrangement of the main circuits which provides for the operation of all four motors from one power plant, secured by the throwing of a single transfer switch which cuts out the dead power plant and transfers the motors. This switch is arranged so that faulty connections cannot be made. The motors operate in series and series-parallel from a single power plant thus providing full tractive power with only one engine running and without overloading the single generator. Operation secured under this condition is at approximately half the normal speed of the locomotive. It has been found that in average switching service about 80 per cent of the work can be performed with one engine shut down and the motors connected to the other in this manner.

The changing of connections in the main circuits, other than the transferring of the motors as described, is handled by magnetically operated switches; similar switches also make and break the cranking currents.

Comparative Cost of Nine-Hour Round Trip in Local Freight Service Between Keokuk, Iowa, and Mt. Pleasant

	Steam Locomotive Class K-2		Gas-Electric 7168
Engineman	$9.48		$9.48
Fireman	7.11		...
Coal, 4.5 tons at $4.26 (Including $9.50 freight)	19.17	Gasoline	8.84
Wood	.22		...
Water, 2 tanks	2.00		...
Oil and waste	.28		.28
Other supplies	.44		.44
Enginehouse service	6.44		3.57
Running repairs	9.63		5.34
Total	$54.77		$27.95

These switches are controlled by low voltage circuits carried through the controller drums, so that high-voltage high-current arcs are entirely removed from the operator.

Voltage relays are provided which control the connection of the battery to the main generators when the engines are idling and which protect the battery from over-voltage. All of the miscellaneous switching apparatus is mounted in closed cabinets below the windows of the operating cab where ready access may be had.

Reversing is done by a main circuit drum on the master controller which is interlocked with the speed handle so that it cannot be thrown under power. The speed handle controls both engine speeds and motor combinations. On the meter and gage panels, main-circuit ammeters, battery-charging ammeter and the necessary air, temperature and oil pressure gages are provided. Standard canopy type switches are provided for the control and starting operations. Electric cab lights and trouble extensions under the engine hoods are provided for convenience.

The locomotive is equipped with the Westinghouse Air Brake Company's schedule AML straight and automatic air-brake equipment, which includes dead man's control handles and foot pedals. The dead man's feature is so arranged that when both the pedal and handle

Comparative Daily Cost of Switching C. B. & Q. Industry Tracks at Crete, Neb*

	Steam Switcher, Class G-3		Gas-Electric 7168
Engineman	$7.16		$7.16
Fireman	5.63		...
Coal, 5.6 tons at $4.26 (Including $11.82 freight)	23.86	Gasoline	4.42
Wood	.44		...
Water, 2 tanks	2.00		...
Oil and waste	.33		.40
Other supplies	.53		.53
Enginehouse service	7.34		4.07
Running repairs	8.08		4.48
Total	$55.37		$21.06

* Steam locomotive costs based on averages over extended period—Gas-electric costs based on averages over a period of one month.

are released it functions immediately to apply the brakes, shut the engines down to idling speed and open the main circuits to the motors thus stopping the locomotive promptly. Air is supplied from two 23 cu. ft. Westinghouse compressors each driven by a belt from one of the engine couplings.

The locomotive is equipped with a 16-cell Exide MVAH-13 storage battery having 200 ampere-hours capacity.

Rate Hearings Begun

Serious financial condition of railroads portrayed at initial session before I. C. C.

WASHINGTON, D. C.

THE campaign of the railways to retrieve their failing credit by a general advance in all freight rates, which was initiated at a meeting of railway executives on May 8, reached the stage of formal presentation to the Interstate Commerce Commission on July 15 at a hearing before Commissioners Meyer, Lewis and Lee and a co-operating committee of seven state commissioners. The opening testimony was largely statistical in nature, outlining the experience of the railways since their return from federal control in 1920 and showing that in spite of the increase in efficiency of operation the reductions in their rate levels through competition and regulation and the reduction in traffic incident to the business depression have created a situation making necessary an emergency percentage increase to avoid serious financial difficulties.

The first hearing is to be devoted to testimony in support of the 15 per cent rate advance, after which an adjournment will be taken to August 31 for cross-examination and testimony in opposition. It was opened with an attendance so great as to tax even the standing capacity of the commission's large hearing room. In addition to the commissioners especially assigned to this case, Commissioner Eastman was present throughout the first session and asked many questions of the witnesses.

H. W. Bikle, general attorney for the Pennsylvania, before introducing the testimony, announced that the railroads desired to amend that part of the application which said it was the intention to preserve existing differentials as to coal, coke, and certain other commodities, in cents per hundred pounds or per ton, by omitting the reference to "other commodities." He said it was unnecessary to make an opening statement, as "we all know why we are here." Commissioner Meyer asked whether, "since the railroads seem to be editing their application" they would care to leave out the statement that "they could not increase rates without the approval of the commission." Mr. Bikle replied that in view of the power of the commission to suspend for seven months any rate tariff filed by the railroads he thought the sentence could stand. Commissioner Meyer announced that the compilation of operating and financial statistics made public by the commission July 11 would be introduced as Exhibit No. 1 and that Dr. M. O. Lorenz, director of the Bureau of Statistics, would take the stand later in connection with them.

The presentation on behalf of the railways was begun by Dr. Julius H. Parmelee, director of the Bureau of Railway Economics, followed by R. H. Aishton, president of the American Railway Association. J. J. Pelley, president of the New York, New Haven & Hartford; W. R. Cole, president of the Louisville & Nashville, and H. A. Scandrett, president of the Chicago, Milwaukee, St. Paul & Pacific, were expected to testify on Thursday. The three presidents are chairmen of the special committees representing the roads of the eastern, southern and western groups in charge of the case.

The statistical picture which Dr. Parmelee presented was a detailed account of the railways' present financial condition, their declining rate of return, the trend of their traffic, their performance with respect to efficiency and economy of operation, the status of their outstanding securities as to maturity, and the relation between net income and fixed charges.

During the period from 1923 to 1930 the carriers were operated with increasing efficiency, Dr. Parmelee emphasized, and expended nearly $7,000,000,000 on their properties for additions and betterments. These improvements aided in reducing substantially railway operating expenses per traffic unit carried. However, "declining revenue per ton-mile and the sharp drop in traffic have brought a reduction in revenue greater than the savings due to increased efficiency and economy of operation," he said. "As a result, net railway operating income has declined to a much greater relative degree than have revenues."

1921-1930 Earnings Below 5¾ Per Cent

For the ten years 1921 to 1930 the shortage of earnings below a 5¾ per cent return amounted to $2,574,877,000, Dr. Parmelee testified. He pointed out that since 1920, when the last previous rate increase was authorized by the commission, the whittling away of the rate structure has reduced the carriers' freight revenue more than $6,500,000,000. In 1929, the year of record net earnings, the carriers as a whole covered their fixed charges only 2.28 times. This ratio dropped to 1.76 times fixed charges in 1930, and in 1931 the forecast now indicates that it will be less than 1.27 times fixed charges, he stated. More than $1,300,000,000 of maturing obligations must be met during the next five years, he said.

The inadequate return of the railroads on the money invested in their properties was described by comparing results in recent years. Analyzing this point, Dr. Parmelee continued: "The rate of return on property investment, which stood at 2.81 per cent in 1921, increased to 1923, and again increased in 1925 and 1926. The rate for 1926 was 4.96 per cent, which is the peak rate of return since the war. There was a drop in 1927, then increases in 1928 and 1929, the rate for 1929 being 4.81 per cent. It then declined to 3.27 per cent in 1930, and dropped to a new low level of 2.07 per cent, on an annual basis, during the first four months of 1931."

The importance of covering fixed charges by a comfortable margin, and the relationship of this problem to railway credit, was fully discussed by Dr. Parmelee. His testimony on this point follows: "The laws of the state of New York provide, with respect to the conditions to be met by railway bonds before they may become eligible for savings banks and trust investment in that state, (among other things) that the issuing railway must earn one and one-half times fixed charges, in at least five of the next six preceding fiscal years, and in the last fiscal year next preceding such investment.

"Other states have varying requirements, more or less restrictive as the case may be, but the New York standard has come to be considered as a yardstick of

sound investment, not only for savings banks and trusteeships, but also for other fiduciary institutions and corporate investments, and for individual investments as well.

"Fixed charges were earned 2.04 times in 1925, 2.18 times in 1926, 1.97 times in 1927, 2.14 times in 1928, and 2.28 times in 1929. The average of the five years from 1925 to 1929, inclusive, was 2.1 times fixed charges. Fixed charges were earned only 1.76 times in 1930. It is to be kept in mind that the foregoing figures are averages, whereas the test that the law provides is of individual application.

"If net railway operating income for the year 1931 declines at the same rate as during the first four months of the year, and if the other factors of the income account remain the same in 1931 as in 1930, fixed charges for 1931 will be earned only 1.27 times. Present indications are that income from outside sources will decline in 1931. This being so, it is probable that the ratio of 1.27 times will not be earned in 1931, although some railways will surpass that figure."

Pointing out that the railways this year are handling less than three-fourths as much freight as they were two years ago, namely 1929, the witness added that passenger miles for the first four months of 1931 decreased approximately 25 per cent as compared with 1929.

The continuous erosion of the rate structure which has been going on every year following the rate increase authorized by the commission in 1920 has resulted in a severe decrease in revenues, Dr. Parmelee said, adding: "Had the average revenue per ton-mile of 1921 been maintained throughout this period, (1921-1930) railway freight revenue would have been greater by an aggregate of $6,582,748,000. The percentage decline in average revenue per ton-mile, in 1921 to 1930, was 16.6 per cent for the United States."

The effect of decreased earnings on railway buying power was shown in the exhibit covering capital expenditures. The testimony continued: "The railways in 1930 maintained their capital expenditures on more than an average scale. As between 1929 and 1930, there was an increase in gross capital expenditures from $853,721,000 to $872,608,000. Beginning with 1923, when the railways made effective their program of increased capital outlays and improved operating efficiency, and ending with 1930, the railways of Class I made aggregate expenditures for additions and betterments of $6,741,716,000.

"The financial returns of the carriers in 1930 were so discouraging, that reductions in capital expenditures were made during the first quarter of 1931. Gross capital expenditures for the three months of 1931 amounted to $93,656,000, compared with a corresponding total of $223,772,000 during the first quarter of 1930, a reduction of 58.1 per cent. The total amount expended for material and supplies in 1929 was $1,329,535,000, and declined to $1,038,500,000 in 1930.

"Statistics recently compiled by the *Railway Age* indicate that during the first four months of 1931 railway purchases of materials and supplies totaled $298,000,000, while the corresponding total for four months of 1930 was $419,000,000."

As a result of improvements to plant and more efficient operating methods, said Dr. Parmelee, the railways made an almost unbroken series of reductions in their unit expenses of freight operation since 1920. "From 1920 to 1930, total operating expenses per 1,000 revenue ton-miles were reduced from $10.66 to $7.43, or 30.3 per cent," he explained. "Transportation expenses were reduced from $5.35 per 1,000 revenue ton-miles in 1920 to $3.52 per 1,000 revenue ton-miles in 1930, or 34.2 per cent.

"The proportion of the revenue dollar available, after expenses, taxes, etc., have been met, was 11.0 cents in 1921. It increased to 19.1 cents in 1926, and reached its high point of the period at 19.9 cents per dollar in 1929. The proportion then declined to 16.5 cents per dollar, and reached its low point of 10.0 cents per dollar during the first four months of 1931."

There has been an increase every year, from 1921 to 1930, in all taxes other than federal income taxes imposed on the railways, said Dr. Parmelee. The federal income tax varies, of course, with the amount of net income and with the rate charged. "The ratio of taxes to total operating revenues," he said, "showed an almost steady upward trend from 1921 to 1930, from 5.0 cents per dollar of revenue in 1921 to 6.6 cents per dollar of revenue in 1930. Lest this increase of 1.6 cents per dollar seem insignificant, a mathematical calculation will show that had the tax ratio in 1930 been 5.0 cents, as it was in 1921, instead of being in fact 6.6 cents per dollar, the carriers' net income would have been larger than it was by $84,500,000. For the first four months of 1931, taxes consumed 7.58 cents out of each dollar of railway gross revenues."

The carriers are faced with a heavy burden—more than $1,300,000,000—of bond and equipment trust maturities which must be met during the next five years, Dr. Parmelee testified. During the current year funded obligations in the amount of $280,000,000 fall due, while subsequent maturities of these obligations total $181,000,000 for 1932, $295,000,000 for 1933, $371,000,000 for 1934 and $207,000,000 for 1935.

In reply to questions from the bench Dr. Parmelee said that railway ton-mileage has now declined 27.9 per cent as compared with the average for the four years 1926-1929. He also made a calculation to show that, while it now appears that the roads will earn fixed charges 1.27 times in 1931, if the proposed rate increase could be made effective on September 1 this might be increased to 1.47 times, while if made effective on October 1 the ratio would be 1.42, on November 1, 1.37, and on December 1, 1.32.

Testimony of R. H. Aishton

R. H. Aishton testified that it is in the best interests of the people to keep the railways in a position where their credit is sound and where required capital is available. The concern of the railroads at the present time, he said, is their ability to continue the fast and dependable service which the country now enjoys. Referring to exhibits which he described as "eloquent" with facts portraying the adequacy of service and the efficiency and economy of railway operation, Mr. Aishton entered a strong plea for consideration of the case on its economic merits. He summarized his conclusions as follows:

"A. It is my opinion that further improvements in efficiency and economy in operation, brought about by better use of facilities in performing transportation service, through progressive and scientific management, must largely depend on the expenditures of large amounts of capital for the improvement of railroad facilities, including equipment. We have witnessed in the past few years a great many improvements in locomotives, cars and mechanical appliances. It is not possible to predict today what further improvements will emerge in the future, but I am one who believes that the limit of possible improvement has not been reached.

"B. In my opinion, however, and regardless of electrical operation and its many desirable features, we must depend in very large measure for economies in operation in the future on the further development and improvement of locomotives, cars, improved machinery and shops and general maintenance facilities.

"C. I do not think it is possible to over-estimate the importance to the Nation as a whole of maintaining railroad credit at a point which will permit a continuation of the capital expenditures which are essential not only that the railroads may provide at all times a machine adequate in every respect to the transportation demands of the country but also that their business may be conducted at the lowest possible operating cost.

"D. The purchasing power of the railroads in connection with their large capital expenditures is of very vital concern to all lines of industry, including agriculture, and any condition which interferes with the expenditures of the railroads for the advancement of transportation is bound to be reflected adversely upon the general public.

"E. It is fully recognized that all efficiencies and economies do not flow from capital expenditures but that some must come from improved methods of operation due to the ingenuity of management and the wholehearted shipper cooperation in many matters in which they play a very vital part. The most expert workman in the world, however, can not do his best with poor tools.

"F. Since it is admitted by everyone that the railroads are and will continue to be the mainstay of our national transportation system, it is my judgment that it is in the best interests of the people as a whole to keep them in a position where their credit is sound and where required capital is available, in order that they may function efficiently in time of peace and be instantly available for service as one of the principal means of national defense.

"It is, in my opinion," Mr. Aishton continued, "a fundamental fact that the greatest part of the increase in efficiency and economy that has taken place in the past few years is due to the very large capital expenditures that have been made by the railroads for improvement of locomotives, cars, signals, trackage and other things leading directly to operating efficiency. It is also my opinion that the hope of future economies and efficiencies in operation depends, in major degree upon a continuation of the policy of replacing the less efficient types of cars, locomotives, and other appliances, and in a continual improvement of the operating conditions on the railroads through a liberal expenditure of capital."

Mr. Aishton demonstrated the marked improvement which the railroads had made in operating efficiency by using comparative statistics of 1920 and 1930. "The reduction in operating expenses in 1930 as compared with 1920 amounts to $1,896,662,459," he explained. "In 1929, which was the highest year of all time from the standpoint of tonnage handled, operating expenses were $1,321,534,884 less than in 1920." His statement analyzing the unit cost of freight operation showed "a very considerable reduction in operating expenses per 1,000 net revenue ton-miles. As an example, if there had been no reduction in this unit cost of operation, 1930 compared with 1920, the 1930 operating expenses of the carriers would have been greater by $1,238,542,000 than they actually were. Making the comparison between 1930 and 1923, the saving amounts to $556,002,000."

Edward D. Duffield, chairman of the Prudential Insurance Company of America, testified as chairman of the Emergency Committee on Railroad Investments of Life Insurance Companies and Savings Banks. He said: "The committee for which I speak does not know whether the proposed 15 per cent increase in freight rates will secure to the railroads a return adequate to support their credit, or whether increased rates will furnish a permanent solution of the problem. We do believe, however, that an emergency now exists, and that measures should be taken at once to support the credit of the railroads until a permanent plan for the stabilization of railroad credit is worked out. We think that a 15 per cent increase in freight rates would afford the necessary temporary relief."

Bonds of Many Roads to Be Removed from List of Legal Investments

An analysis of the 1931 earnings of the 67 railroads which had gross revenues in 1929 of $10,000,000 or more, based on a projection through the year of the results for the first four months, to show how many of these roads are likely to fall below the 1.50 ratio of earnings to fixed charges, and whose bonds for that reason are likely to be excluded from the list of legal investments for trustees and savings banks in New York, was submitted to the commission on July 13 in intervening petitions filed by the Emergency Committee on Railroad Investments of Life Insurance Companies and Mutual Savings Banks and the Security Holders' Committee on the Railroad Emergency.

This showed that only 21 of these 67 roads will earn their fixed charges 1.5 times or more in 1931, on the basis of the present showing, and that of the 35 roads whose securities are now on the legal list 20 will not equal their fixed charges so that all the bonds of such roads will for that reason be removed from the legal list. The aggregate prinicpal amount of the bonds of the 35 roads, excluding terminal bonds, is $7,562,500,000 and the aggregate that would be removed from the list is $5,748,500,000, or 76 per cent of the total. "The disastrous effect of the removal of so vast a volume of securities from said legal list", the petition of the Security Holders' committee said, "upon the credit of the railroads and their future financing, is apparent. It would preclude that continuous inflow of capital which the commission has said is essential to the maintenance of an adequate national transportation system."

The petition of the Emergency Committee also stated that during 1930 the margin by which the railroads of the United States earned their fixed charges was largely reduced. In the five calendar years ending with 1929 the fixed charges of Class I roads were earned 2.12 times on the average. In 1930 they were earned only 1.76 times and on the basis of the net railway operating income for the first five months of this year the Class I roads will earn their fixed charges only 1.27 times. This is on the assumption that the decline from 1930 continues, that non-operating income will be as great in 1931 as in 1930 and that there will be no increase in fixed charges.

Twenty-two roads, it was estimated, will fail to earn fixed charges less than 1.5 times and only 20 roads will earn fixed charges 1.5 times or more. "If this result should occur," it is stated, "and your petitioners see no escape from it unless conditions are forthwith corrected—the position at the beginning of 1932 would be that the bonds of only 14 of the 67 largest railroads in the country would be eligible for savings bank investment in New York and that the bonds of some of

these 14 would be close to the line. This is obviously an emergency condition of a seriousness which has not confronted the carriers and the owners of their securities since the emergency of 1920, which was met temporarily by the six months guarantee of the federal government and later by the general rate increases authorized by this commission on July 29, 1920.

"The institutions represented by this committee are concerned for the certainty of the income from hundreds of millions of dollars of the railroad securities held by them, by reason of the drastic and progressive decline in railroad revenues since the Fall of 1929, which, unless corrected without delay, may lead to losses which would injure the interests of their policy holders and depositors respectively. The result would so seriously affect the public interest that the institutions represented by the committee deem it incumbent on them to present the situation fully and frankly to this commission. Under the existing conditions it is apparent that the savings banks and life insurance companies could not properly make further investments in many railroad securities, even including some securities now on the legal list.

"In the opinion of your petitioners, an increase in railroad revenues would greatly contribute to a revival of business and to an earlier termination of the business depression. Your petitioners believe this to be so, first: Because the direct result of an increase would be to increase purchases and employment; and second: Because the indirect effect would be to strengthen general confidence."

It was stated that the aggregate railroad bond holdings of all the life insurance companies and savings banks are approximately $4,700,000,000.

Commission Does Not Want Informal Advice

The Interstate Commerce Commission on July 9 took steps to reduce the volume of informal advice it has been receiving as to how to decide the rate case by informing various persons who had written or telegraphed about the case in effect that they were wasting their time and stationery, because the commission is governed by sworn evidence and is not supposed to be influenced by informal letters. The commission made public a notice that Secretary McGinty had written letters "advising parties that no advice, formal or informal, written or printed, pleadings nor protests, are necessary in this proceeding", and that "if filed they have the same status as letters and will be placed with the correspondence in this case." The letters also stated that "all parties desiring to offer testimony pertaining to the questions presented by the carriers' petition may appear for that purpose at future hearings already announced or to be announced, but that first the commission should be advised of the general character of the evidence and approximate time required to introduce it." Secretary McGinty also said that so many requests have been received from persons asking that their names be placed on a list to be notified of proceedings in this case that it will not be practicable to maintain any mailing list except of parties who take active part in the proceedings after entering their appearances at the hearings, but that full publicity will be given through the daily press and traffic publications to any and all announcements regarding hearings, briefs, arguments, etc. Several of the protests to which Secretary McGinty referred were from Senators and Representatives.

The railroad proposal for increased rates was characterized as a "crude rehabilitant" in a proposed report made public by two of the commission examiners, W. A. Hill and C. G. Jensen, Jr., on July 14, recommending that the commission find unlawful, with certain exceptions, schedules proposed by the railroads reducing the less-than-carload ratings in official and Illinois classifications on various food products in glass containers, on the ground that they would "only serve to deplete further an already diminished income, and this at a time when respondents are before the commission in another proceeding pleading that ruin will be their lot unless the crude rehabilitant of a percentage increase in all rates is quickly administered." The examiners said that the present rates on these prodcts are reasonable, with certain exceptions, and that the reduction represented "only a weak yielding on the part of respondents to the demands of a well-organized group of shippers".

"Under section 15a of the statute," they said, "it is the duty of the commission to initiate a structure of rates which will permit carriers under proper management to earn a fair return on the value of their property used in transportation service. And there is also a continuing duty on the commission to see that the rate structure so initiated is not impaired or destroyed by rate reductions improvidently made by the carriers."

* * *

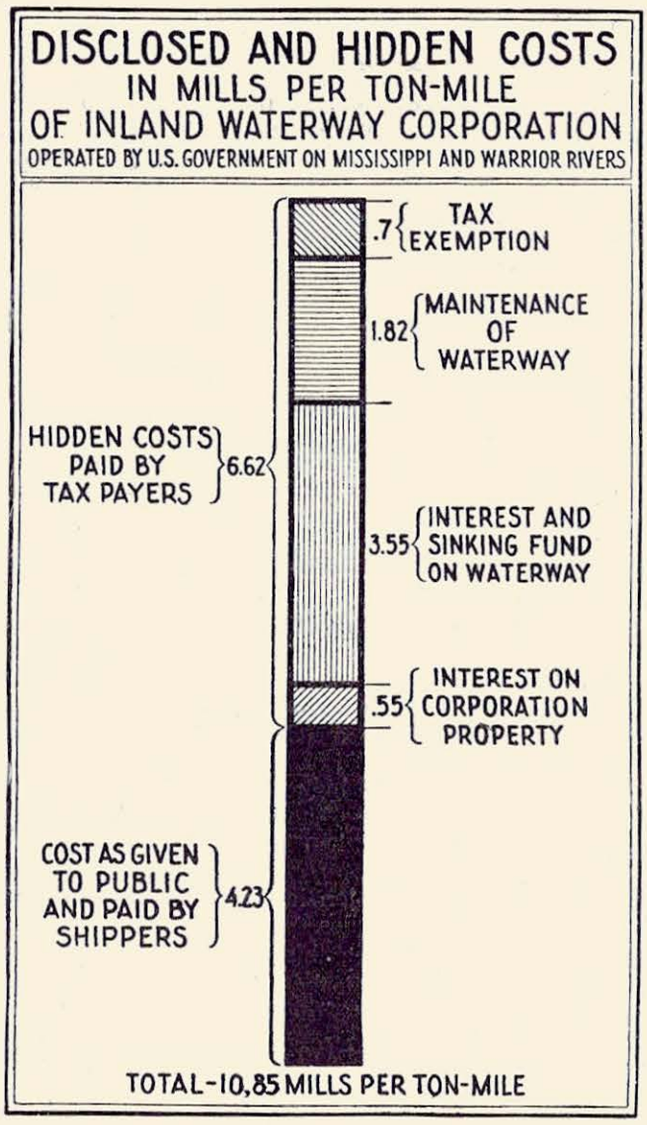

DISCLOSED AND HIDDEN COSTS
IN MILLS PER TON-MILE
OF INLAND WATERWAY CORPORATION
OPERATED BY U.S. GOVERNMENT ON MISSISSIPPI AND WARRIOR RIVERS
.7 TAX EXEMPTION
1.82 MAINTENANCE OF WATERWAY
HIDDEN COSTS PAID BY TAX PAYERS 6.62
3.55 INTEREST AND SINKING FUND ON WATERWAY
.55 INTEREST ON CORPORATION PROPERTY
COST AS GIVEN TO PUBLIC AND PAID BY SHIPPERS 4.23
TOTAL-10,85 MILLS PER TON-MILE

Chart prepared by the Ohio State Chamber of Commerce

Efficiency Tests—Car Loading

Two of the reports on practical problems, presented at the Superintendents' convention

TWO of the reports that aroused special interest at the convention of the American Association of Railroad Superintendents at St. Louis, Mo., on June 9-12 dealt with the methods of conducting efficiency tests and action to be taken thereon and on means of promoting the heavier loading of cars. These reports, which, with the discussion thereon, are abstracted below, supplement the report of the convention which appeared in the *Railway Age* of June 20 and the abstracts of four reports and papers that appeared in the issue of July 4, page 17-20. Abstracts of other reports and papers will appear in succeeding issues.

Special Report of Trainmasters

The proper methods of conducting efficiency tests, the means by which an operating officer can best secure adherence by employees to train rules, and the best methods of educating employees concerning train rules were considered by a special committee of trainmasters. An abstract of the report of this committee, of which Claude A. Hughes, trainmaster, M. P., Wichita, Kan., was chairman, follows:

Proper Methods of Conducting Efficiency Tests

To a far greater extent than may commonly be recognized, the economy of operation, the quality and dependability of service, and certainly the safety of operation and freedom from accidents and personal injuries depend upon the will and ability of division officers to enforce strict rule observance. We conceive the purpose of efficiency tests to be to bring to those tested a condition identical with ordinary operation, to determine whether proper action will be taken as required by the rules, and then to correct any misunderstanding of the rule, or failure to comply with it. Everyday operation will result in creating conditions fraught with potential hazard, but we do not consider it necessary or desirable to duplicate these hazards in tests.

Tests without hazards can readily be selected that will require the same performance as those in which hazards exist, and such action should be combined with the work of conducting tests, which when properly done, would enable us to ascertain whether the employee tested is carrying out the requirements, in actual practice, of all rules and special instructions. When tests are made, see that they are made fairly, because any sharp practice in tests will lower the morale of the men.

Adherence to Train Rules by Employees

The best if not the only way to insure a high order of rule knowledge and observance is through intense, constant and sincere personal interest in rules and safety on the part of every division officer, foreman and supervisor, and more especially each superintendent and trainmaster. It is entirely fair to say that the rule knowledge and rule observance on any operating division will be good, fair or bad in direct proportion to the interest a superintendent displays in such things.

Division officers should spend as much time as possible on the road with the men and see them in actual performance under all kinds of operating conditions, observing the men as they perform their duties and never overlooking an opportunity to talk rules with them; never failing to call attention to any rule violation, no matter how small. If we overlook a rule infraction, that will invite violations of other rules; and only by constant admonition of the individual employee, making every man feel the responsibility connected with his job and the absolute necessity of performing his duties as required by all the rules, can the desired results be secured. There is no escaping the intimate relationship between strict rule observance and all those things which go to make first class operation, and likewise there can be no escape from the logical conclusion that division officers can make rule observance exactly what they want it to be.

An employee who knowingly violates the rules and continues to do so should not be retained in the service. In some cases an investigation of cases of violation of the rules and instructions is necessary, and it will be found that such investigations bring out the facts, as well as any misunderstanding, whether of a minor nature or a serious offense.

Educating Employees Regarding Train Rules

It is a good plan for the trainmaster to hold a class meeting once a month, or oftener if possible, to discuss rules, instructions and hazards of accident.

When a new man is employed he should be required to make student trips until he is fully familiar with the road, and he should not be allowed to work until he has passed a satisfactory examination on all rules and instructions, and the employing officer is satisfied that the new man is conversant with all rules.

Each new man should be instructed to notify the men he is working with that he is a new man and ask them to help him; all old employees should take an interest in new employees.

The strict compliance with all rules and instructions will reduce personal injuries.

The "Rule a Day" plan should be adopted on all railroads.

All staff officers should be furnished with a book of efficiency test blanks and be required to make observation tests as often as possible.

Discussion

The discussion of this report was opened by a question as to the action that should be taken with reference to an employee found violating a rule through a surprise test. F. J. Myers (C. N. R.) stated that it is the practice of his road to give consideration to

fortunately outweigh in individual cases the benefit of compliance with a code of rules designed to bring the greatest good to the greatest number in the elimination of empty haul and expediency may prompt a departure from strict car service rule observance in order to bring about bettered per diem earnings, even at the expense of increased empty mileage, both upon the rails of the offending carrier and on those of its neighbor.

Obviously, if one line can hurry all foreign cars off its rails, empty, and utilize system cars exclusively to protect its off-line loadings, while neighbor lines are adhering to the provisions of the car service rules, a temporary advantage in per diem costs will accrue to the offending line. As a practical matter, such a policy can bring only very temporary gains in per diem, as against long-extended increases in empty mileage, since neighbor lines can be depended upon to retaliate in like manner, and the ultimate outcome must be a heavy increase in empty mileage on all the lines involved.

Where there are loadings entailing a long haul on the rails of the loading line, and a comparatively short haul on rails of connecting carriers, and where proper ownership foreign cars are being hauled in parallel to the loaded movement on the originating carrier, it would appear to be economical for the originating carrier to assume the expense of switching out and applying the foreign car, rather than using the system car. As against any argument that considerable per diem may accrue on the foreign car while being switched in and loaded, there is, of course, the consideration that loaded cars generally move faster than empties, and that it might be entirely possible that such foreign cars could be switched out on the division in question, loaded and moved off line in even less time than they would clear the rails of the loading line empty.

A common violation of the rules is the loading of a foreign car opposite to the direction of home. The rules provide that this *may* be done, *to secure a load to or via the owning road.* The chances are probably not more than one in one hundred that such foresight is being practiced, but rather that the loading contrary to homeward direction is merely a violation of the rule. Such loading, or violation, entails a longer empty movement to get the car to its owner, it is put further out of line for homeward movement, and, the owner is being deprived of the possible use of a car it has provided for its shippers.

Loading in Switching Service

On cars loaded in switching service, for connections' road haul, there is, of course, an even stronger incentive, from a selfish standpoint, to apply system cars in times of cars surplus. Here the loading line, through utilizing system cars, may avoid a certain amount of expense incident to ordering and switching proper foreign cars supplied by road haul lines, and may insure a certain amount of per diem earnings on its own cars through their application of such business. These benefits, however are again only temporary, and may generally only be secured at the expense of a considerable increase in empty mileage on all the lines involved.

Commodity Inspection and Carding of Equipment

There is no tool in the entire car distribution kit that is of more importance than adequate commodity inspection and carding, particularly as it applies to box cars. The committee recommended that the association approve the following suggestions:

1. The uniform commodity carding of cars is endorsed as proper procedure for general adoption so that cars may be allocated more quickly and with less expense to the loading for which they are suited.
2. Railroads should consider the advisability of maintaining their equipment in as nearly perfect condition as practical for any loading made available, in the interests of conserving empty movement.
3. That the principles of the car service rules be endorsed as a means, by their observance, of curtailing empty mileage.
4. That increased effort be made to work with and obtain the cooperation of the shipper in seeking to match up the proper car with the available load, one of which means will be to encourage the shipper to place orders for cars required, specifying the commodity to be loaded and the destination railroad as far in advance as practical.

Discussion

This report led to active discussion. F. O. Coleman (M. & St. L.) called attention to the fact that the heavier loading of cars reduces the number of units to be handled and the track space required. J. M. Niland (B. & O.) stated that the results secured on his road had been astounding, especially in the handling of coal, coke and ore. Even where the conservation of equipment is no factor, heavier loading has been shown to result in vast operating economies. Some trouble was experienced with overloading at first, but this was confined to less than 1 per cent of the cars handled and was soon corrected. Mr. Stevens stated that one road has found overloading of so little consequence that it has taken from its tariffs all penalties for such loading. He also added that heavier loading reduces demurrage.

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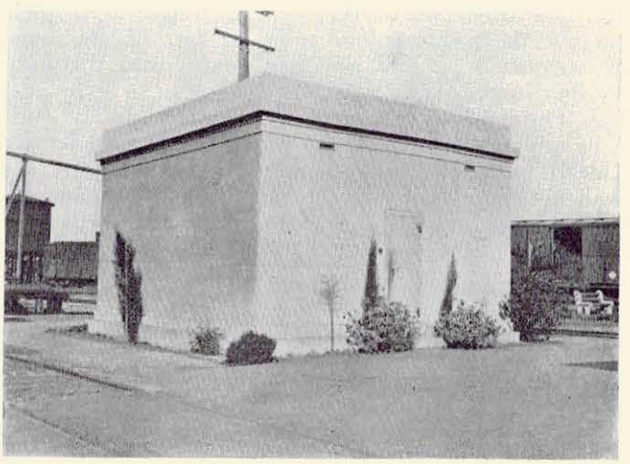

The Fire and Earthquake-Proof Record Vault of the Mechanical Department of the Southern Pacific, in the Shop Area at West Oakland, Cal.

Efficiency Tests—Car Loading

Two of the reports on practical problems, presented at the Superintendents' convention

TWO of the reports that aroused special interest at the convention of the American Association of Railroad Superintendents at St. Louis, Mo., on June 9-12 dealt with the methods of conducting efficiency tests and action to be taken thereon and on means of promoting the heavier loading of cars. These reports, which, with the discussion thereon, are abstracted below, supplement the report of the convention which appeared in the *Railway Age* of June 20 and the abstracts of four reports and papers that appeared in the issue of July 4, page 17-20. Abstracts of other reports and papers will appear in succeeding issues.

Special Report of Trainmasters

The proper methods of conducting efficiency tests, the means by which an operating officer can best secure adherence by employees to train rules, and the best methods of educating employees concerning train rules were considered by a special committee of trainmasters. An abstract of the report of this committee, of which Claude A. Hughes, trainmaster, M. P., Wichita, Kan., was chairman, follows:

Proper Methods of Conducting Efficiency Tests

To a far greater extent than may commonly be recognized, the economy of operation, the quality and dependability of service, and certainly the safety of operation and freedom from accidents and personal injuries depend upon the will and ability of division officers to enforce strict rule observance. We conceive the purpose of efficiency tests to be to bring to those tested a condition identical with ordinary operation, to determine whether proper action will be taken as required by the rules, and then to correct any misunderstanding of the rule, or failure to comply with it. Everyday operation will result in creating conditions fraught with potential hazard, but we do not consider it necessary or desirable to duplicate these hazards in tests.

Tests without hazards can readily be selected that will require the same performance as those in which hazards exist, and such action should be combined with the work of conducting tests, which when properly done, would enable us to ascertain whether the employee tested is carrying out the requirements, in actual practice, of all rules and special instructions. When tests are made, see that they are made fairly, because any sharp practice in tests will lower the morale of the men.

Adherence to Train Rules by Employees

The best if not the only way to insure a high order of rule knowledge and observance is through intense, constant and sincere personal interest in rules and safety on the part of every division officer, foreman and supervisor, and more especially each superintendent and trainmaster. It is entirely fair to say that the rule knowledge and rule observance on any operating division will be good, fair or bad in direct proportion to the interest a superintendent displays in such things.

Division officers should spend as much time as possible on the road with the men and see them in actual performance under all kinds of operating conditions, observing the men as they perform their duties and never overlooking an opportunity to talk rules with them; never failing to call attention to any rule violation, no matter how small. If we overlook a rule infraction, that will invite violations of other rules; and only by constant admonition of the individual employee, making every man feel the responsibility connected with his job and the absolute necessity of performing his duties as required by all the rules, can the desired results be secured. There is no escaping the intimate relationship between strict rule observance and all those things which go to make first class operation, and likewise there can be no escape from the logical conclusion that division officers can make rule observance exactly what they want it to be.

An employee who knowingly violates the rules and continues to do so should not be retained in the service. In some cases an investigation of cases of violation of the rules and instructions is necessary, and it will be found that such investigations bring out the facts, as well as any misunderstanding, whether of a minor nature or a serious offense.

Educating Employees Regarding Train Rules

It is a good plan for the trainmaster to hold a class meeting once a month, or oftener if possible, to discuss rules, instructions and hazards of accident.

When a new man is employed he should be required to make student trips until he is fully familiar with the road, and he should not be allowed to work until he has passed a satisfactory examination on all rules and instructions, and the employing officer is satisfied that the new man is conversant with all rules.

Each new man should be instructed to notify the men he is working with that he is a new man and ask them to help him; all old employees should take an interest in new employees.

The strict compliance with all rules and instructions will reduce personal injuries.

The "Rule a Day" plan should be adopted on all railroads.

All staff officers should be furnished with a book of efficiency test blanks and be required to make observation tests as often as possible.

Discussion

The discussion of this report was opened by a question as to the action that should be taken with reference to an employee found violating a rule through a surprise test. F. J. Myers (C. N. R.) stated that it is the practice of his road to give consideration to

a man's previous record, but that in all cases the employee receives a letter giving the facts, a copy of which he initials and returns for insertion in his personal record file. This is done even though the letter is only cautionary in character.

F. E. Summers (A. T. & S. F.) urged that care be taken to avoid making surprise tests partake of the nature of traps, but rather that they should be checks on employees' actions in their regular routine of duty. He advocated the application of discipline for violations of rules uncovered by surprise tests just as when they involve accidents, deprecating the idea of waiting until an accident occurs before applying a penalty. F. O. Coleman (M. & St. L.) places a letter in a man's personal record file whenever he meets an efficiency test successfully, as well as when he fails, sending a copy to the man in each event. H. L. Margetts (M. C.) reported that it is the practice of his road to bring an employee who fails in a test in for a formal investigation in the same manner as following an accident. J. M. Walsh (I. C.) called attention to the importance which the Interstate Commerce Commission attaches to an employee's record, including efficiency tests, when investigating an accident.

Car Loading and Car Service Rules

Three subjects, the Heavier Loading of Cars, Methods of Inducing Consignees to Thoroughly Unload and Clean Cars, and Car Service Rules, were considered by a committee of which A. P. Stevens, district manager, Car Service division, A. R. A. New York, was chairman. This report follows, in part:

1—Heavier Loading of Cars

Heavier car loading today is suffering from inertia and a lack of sympathetic understanding. True, nearly everybody talks about heavier loading, but despite this general abstract conception of the advantages of the practice few people do anything definite about it. And yet, where constructive action has been taken, results have always been secured.

Perhaps this is due in part to a misunderstanding or misconception of exactly what is meant by heavier loading. When the practice was first advanced as a measure of economy in war time, the conditions were quite different than they are today. In order to assure the maximum use of every available car during that period of stress, we resorted to high arbitrary minimums, secured through the Food Administration on all foodstuffs; through double loading and other expedients, and through the Fuel Administration, on coal. Then it was not only a question of economy to utilize all available space but a patriotic duty. With the passing of that condition the necessity for such arbitrary measures also passed, until today all that remains the same is the concept of the problem of heavier loading, and that concept is wrong.

We still call it heavier loading when what we really mean is a maximum use of equipment—maximum use where it is practicable without in any way disturbing the normal course of business practice. To give a concrete example, let us cite an actual case that was disclosed on a heavier loading check of a railroad by a representative of the Car Service division.

A shipper of agricultural limestone forwarded to one consignee in a three-day period 12 cars of limestone. These 12 cars carried a total of 651.38 tons of the commodity, which, averaging 54.3 tons per car, looks like good loading. Yet when the movement was analyzed we found that one car of 1,730 cu. ft. capacity carried a load of 118,500 lb., and another car of exactly the same capacity carried only 102,600 lb., or nearly 8 net tons less. One car earned $9.78 less than the other car of the same earning capacity in the same traffic.

Applying the present concept of heavier loading practice to this movement, we find that we do not ask the shipper to load one more pound of limestone or ask the receiver to in any way increase his inventory. Having received this volume of 651.38 tons in three days we merely ask that he use the cars to their maximum capacity. Under that process of reasoning we find that 11 cars, or one less car than was used, will answer the transportation demand. The cars supplied had a load limit averaging 123,283 lb. each. If we load 11 cars with an average of only 118,431 lb., or less than the heaviest car loaded, we will carry the same amount of traffic, save the necessity of the shipper loading an extra unit, save the loaded movement of the car, save the necessity of the receiver unloading the extra unit, as well as one less possibility of demurrage, and increase the tonnage on 11 cars, 4½ net tons. This maximum use of equipment will then provide the same earnings on 11 cars as were earned on 12 or increase the earnings per car from an average of $66.76 to $72.84, or $6.08 per car. In this movement the line haul carrier absorbed a switch movement of $4.50 per car on each car handled. So in addition to the saving of the loaded movement on one car it also saves the switching charge on the car eliminated.

Improvement Can be Shown

That this method of approach to the problem is sound is indicated by the results of a campaign inaugurated early last year on a mid-western railroad. This railroad in 1929 originated over a million carloads of traffic and attained an average load per car of 33.3 tons. In the face of adverse conditions in 1930 this same railroad attained an average load per car of 34.3 tons, or exactly one ton per car heavier than in the best traffic year of history. This improvement was not the result of newer and larger cars, but a direct result of consistent effort. The increase over 1929 saved the necessity of loading 30,019 carloads. If only the saving in mileage cost is applied to the cars eliminated, using 300 miles loaded and one-third of the loaded miles empty, and a figure of 6 cents per car mile, this railroad saved more than $700,000 in operating costs.

Nor is this an isolated example. Another line began a similar campaign in June, 1930, and by December was able to show an increase of 0.7 ton per car for the year. This 0.7 ton represents the elimination of several thousand cars and a saving in operating costs of several hundred thousand dollars.

In 1930, a number of major trunk lines instituted a campaign to increase the net tons per car. No one of the lines starting the work has given any indication of abandoning the campaign—in fact, continued enthusiasm on the part of the rank and file is reported and the results secured are showing a splendid return in comparison to the effort expended.

In heavier loading, as we now conceive it, we have an opportunity to reduce operating costs without the

expenditure of a cent. All it takes is a little intelligent, well-directed effort. A definite plan of procedure must be followed to prevent wasted effort on users of railway service who, because of financial limitations or other limiting factors, must continue to use the minimum of carload rail service. The larger users, wholesale users, are the ones who can best aid, and it is to these users that any campaign for heavier loading or maximum use of equipment must be carried. And in approaching these users care should be taken that the matter is presented in a concrete form and not as an abstract idea. It should include an analysis of the users' demand for transportation, and a presentation of that analysis when justification of an appeal for maximum use of equipment can be sustained by the facts presented.

Conclusions

It is the suggestion of the committe that the association adopt the following resolution:

1. That each road set up an organization to supervise and direct the campaign for increasing the load per car, where such an organiztion does not now exist.
2. That efforts to bring about heavier loading be concentrated upon cases where a considerable number of cars of the same commodity move to one consignee within a comparatively short period, and that reports intended to be used as a basis for soliciting heavier loading be prepared to include only these concentrated movements, eliminating instances where one car may move at infrequent intervals to one consignee. As a practicable basis it is suggested that heavier loading reports be prepared by local forces to show only those cases where three or more cars of the same commodity move to the same consignee within a week.
3. That, in the interest of securing shipper and receiver co-operation in the heavier loading campaign, consideration be given to the elimination of charges against shippers or receivers for the transfer or reduction of overloads of bulk commodities.
4. That credit for business secured or moved be computed on a tonnage rather than a carload basis.

2—Inducing Consignees to Clean Cars

The committee recommended, as a means of inducing consignees to unload and clean cars thoroughly before returning them to the railroad, that:

1. The education of receivers of freight as to their duty in the complete unloading of cars be continued through the shippers' advisory boards and the local division forces of the railroads.
2. Through any necessary revision of M.C.B. Rule 2, or other A.R.A. rules, the provisions of Car Service Rule 16 to the effect that "empty cars containing refuse shall not be offered in interchange" shall be made enforceable, permitting a road to refuse to accept such cars when offered in interchange.

3—Car Service Rules and the Superintendent

Briefly, the code of Car Service Rules in effect today is designed to get freight cars back to the territory they were built to serve with the least practicable amount of empty mileage. Obviously, if all loadings were protected with cars owned by the loading line, and it were necessary to send such cars back empty to the loading line after release from their load, there must be built up an empty mileage practically equal to the loaded mileage, placing a very considerable non-productive burden on the railroads.

The percentage of empty mileage to total car miles for the past nine years is as follows:

	Per Cent
1922	32.8
1923	34.3
1924	34.9
1925	35.5
1926	36.3
1927	37.1
1928	37.1
1929	37.2
1930	38.6

The volume of empty mileage for the year 1930 totaled 9,961,136,000. It will be seen that the trend of percentage of empty to total car mileage has been upward throughout this nine-year period and that the volume as a whole amounts to a prodigious total.

Little, if anything, is practical of accomplishment with those types of car not considered as available for "General Service." The tank car, the hopper type of coal car, stock cars, and to a lesser degree the refrigerator, gondola and flat must return to loading territory empty, generally speaking. Our problem centers principally, therefore, with the box car, its use and movements. One factor having considerable effect upon empty mileage must be recognized in the beginning, and that is the condition of the car. No car service rules ever framed will make a box car which is maintained for rough freight loading fit for either grain or flour.

Another factor having an effect upon empty mileage is the state of general business conditions, and whether there is a shortage or surplus of cars. Just now we are in the midst of the greatest and most prolonged period of car surplus ever recorded. The effect of surplus cars in empty movements is in no way measurable. The fact, however, that the percentage of empty mileage to total was high during the peak business year of 1929, is indicative that good business alone is not the answer to the increasing trend of the ratio of empty mileage.

Still another factor in this problem is the changing proportion of commodities handled. There is an ever-increasing volume of "one-way" traffic. Refrigerator car products—fresh fruits and vegetables—are increasing in movement year by year. The tonnage of products handled in tank cars has increased over a period of years, while that of coal, sand, stone and gravel is variable. Pipe for oil wells and pipe lines is moving west and southwest in increasing volume annually.

Per Diem vs. Empty Mileage

Present car service rules make it the duty of each railroad to utilize available foreign cars in preference to system cars in protecting off-line loadings, where such loading will take the foreign car to or in the direction of the owning railroad. In other words, the rules are designed toward getting as much loaded service as possible out of the car returning to the territory it was built to serve, and to make the foreign car "pay its way" in the movement back to the owners. Per diem is measured at $1 per car per day, and presumably it has much to do with the nature of the instructions issued for the handling of cars which are in the possession of the individual railroad. Car Service Rule 4 provides that 6 cents per mile shall be paid by one road to another for the movement of an empty car when short routed to the owner and it measures the average cost of an empty movement.

In times of car shortage there will be little disposition on the part of individual railroads to depart from the provisions of car service rules. In times of car surplus, however, the lure of the per diem dollar may un-

fortunately outweigh in individual cases the benefit of compliance with a code of rules designed to bring the greatest good to the greatest number in the elimination of empty haul and expediency may prompt a departure from strict car service rule observance in order to bring about bettered per diem earnings, even at the expense of increased empty mileage, both upon the rails of the offending carrier and on those of its neighbor.

Obviously, if one line can hurry all foreign cars off its rails, empty, and utilize system cars exclusively to protect its off-line loadings, while neighbor lines are adhering to the provisions of the car service rules, a temporary advantage in per diem costs will accrue to the offending line. As a practical matter, such a policy can bring only very temporary gains in per diem, as against long-extended increases in empty mileage, since neighbor lines can be depended upon to retaliate in like manner, and the ultimate outcome must be a heavy increase in empty mileage on all the lines involved.

Where there are loadings entailing a long haul on the rails of the loading line, and a comparatively short haul on rails of connecting carriers, and where proper ownership foreign cars are being hauled in parallel to the loaded movement on the originating carrier, it would appear to be economical for the originating carrier to assume the expense of switching out and applying the foreign car, rather than using the system car. As against any argument that considerable per diem may accrue on the foreign car while being switched in and loaded, there is, of course, the consideration that loaded cars generally move faster than empties, and that it might be entirely possible that such foreign cars could be switched out on the division in question, loaded and moved off line in even less time than they would clear the rails of the loading line empty.

A common violation of the rules is the loading of a foreign car opposite to the direction of home. The rules provide that this *may* be done, *to secure a load to or via the owning road.* The chances are probably not more than one in one hundred that such foresight is being practiced, but rather that the loading contrary to homeward direction is merely a violation of the rule. Such loading, or violation, entails a longer empty movement to get the car to its owner, it is put further out of line for homeward movement, and, the owner is being deprived of the possible use of a car it has provided for its shippers.

Loading in Switching Service

On cars loaded in switching service, for connections' road haul, there is, of course, an even stronger incentive, from a selfish standpoint, to apply system cars in times of cars surplus. Here the loading line, through utilizing system cars, may avoid a certain amount of expense incident to ordering and switching proper foreign cars supplied by road haul lines, and may insure a certain amount of per diem earnings on its own cars through their application of such business. These benefits, however are again only temporary, and may generally only be secured at the expense of a considerable increase in empty mileage on all the lines involved.

Commodity Inspection and Carding of Equipment

There is no tool in the entire car distribution kit that is of more importance than adequate commodity inspection and carding, particularly as it applies to box cars. The committee recommended that the association approve the following suggestions:

1. The uniform commodity carding of cars is endorsed as proper procedure for general adoption so that cars may be allocated more quickly and with less expense to the loading for which they are suited.
2. Railroads should consider the advisability of maintaining their equipment in as nearly perfect condition as practical for any loading made available, in the interests of conserving empty movement.
3. That the principles of the car service rules be endorsed as a means, by their observance, of curtailing empty mileage.
4. That increased effort be made to work with and obtain the cooperation of the shipper in seeking to match up the proper car with the available load, one of which means will be to encourage the shipper to place orders for cars required, specifying the commodity to be loaded and the destination railroad as far in advance as practical.

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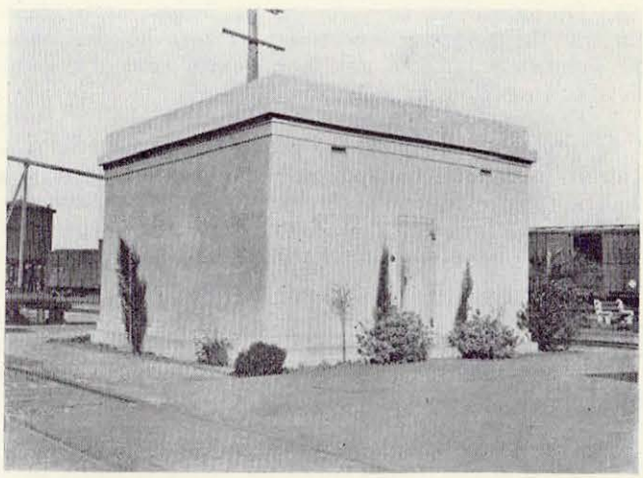


The Fire and Earthquake-Proof Record Vault of the Mechanical Department of the Southern Pacific, in the Shop Area at West Oakland, Cal.

I.C.C. Investigates Purchasing Methods in St. Louis

L. W. Baldwin on stand with other Missouri Pacific officers—Affairs of M-K-T, Frisco and Wabash also investigated

THE results of fact-finding explorations of railway purchasing and traffic relationships launched by the Interstate Commerce Commission in February, 1930, in St. Louis, Mo., were revealed in that city on July 8 to 13 when officers of the Missouri Pacific, the Missouri-Kansas-Texas, the St. Louis-San Francisco and the Wabash were examined at a public hearing regarding their purchasing policies and methods and 4300 letters were introduced on the subject, about 4000 of which dealt with the activities of the Missouri Pacific. These letters related to negotiations with over 200 firms, including 47 coal dealers, 10 cement companies, 16 dealers in paint and varnish, 30 oil companies, 6 manufacturers of rubber products and 10 or more dealers in waste, as well as with firms manufacturing draft gears, brake hardware, sewer pipe, sand, ballast, wheelbarrows, machinery, paper, chemicals, asbestos and roofing and miscellaneous commodities.

L. W. Baldwin on Reciprocity

Questioned regarding his views on reciprocity, L. W. Baldwin, president of the Missouri Pacific, stated that reciprocity had a large bearing in all business and thought it was natural and proper for a railroad to work along such lines. He agreed that instances had come to his attention where shippers had gone too far and that the practice did not increase railroad traffic as a whole. He said that the Missouri Pacific had increased its traffic by reciprocity. He added, however, that he had come to the conclusion that one road had little opportunity to take another road's business because the movement of nearly all traffic is in the hands of the shipper. He also said that the traffic a railroad handles is intimately associated with service and, after pointing out that the service of the Missouri Pacific "wasn't any too good a few years ago," expressed the belief that about 95 per cent of the road's increased business was the result of the improvement in its service.

Questioned about correspondence which showed that the president of the Denver & Rio Grande Western (which is half owned by the Missouri Pacific), had secured authority to include the traffic of the Missouri Pacific in soliciting shipments from the Colorado Fuel & Iron Company, he explained that the Rio Grande was at a disadvantage with other roads in competition for this traffic because of its smaller buying power and that he had approved the plan. He imagined that the road's purchases were similarly used on occasions by the Gulf Coast Lines and saw no objection to it.

Bids on the Missouri Pacific

W. A. Hopkins, general purchasing agent of the Missouri Pacific, which expends between 35 and 40 million dollars for material and supplies in a normal year, testified that he familiarizes himself with the traffic value of bidders for supplies, and takes traffic into consideration in awarding purchases. The purchasing department does not usually secure the traffic information directly from shippers, he stated, but from the traffic department, although traffic reports are volunteered by shippers. The information secured from or volunteered by the traffic department, he said, is generally in the form of a recommendation to give consideration to the shippers in question. Bidders names are not removed from the inquiry lists for want of traffic, and the lowest bidder is always awarded a portion of the order, even though he may have no traffic, but bidders with traffic value are often asked to meet the low price so that they can participate in the order.

In case of threatened traffic diversions, he said that it would be his policy to try to satisfy the firms with a division of an order if they would meet the competitive price. He stated, that purchases are made at the lowest possible cost and that a premium would not be paid, even if the traffic secured would produce a net gain. He said the general policy was to place the cement business with local firms, but recalled placing certain orders with off-line firms and said that the firm had given the Missouri Pacific a lot of business. He stated that a cement order might be divided with a firm having the next shortest haul for traffic reasons although such a division would mean an increased cost to the extent of the longer haul.

The road has contracts for its fuel oil requirements with four refineries from which it agrees to take a certain amount of oil per year at a flat price, adjusted yearly. The allocation of orders is based in part on the traffic of each refinery. When additional oil is purchased, it is purchased at the contract price. He disclaimed knowing if the road had suffered a loss of traffic growing out of the alleged purchases of fuel oil in the same region by the Rock Island at higher prices and whether the refineries had ever insisted on shipping the oil in private cars.

Coal Buying on the Missouri Pacific

All the coal used on the Missouri Pacific, with the exception of that produced in company-owned mines, W. G. Vollmer, assistant to the president, stated is purchased on a reciprocity basis. The coal is purchased directly from the mines or through accredited sales agencies of mines located on the Missouri Pacific. None of the coal is purchased under contract except certain strip coal in Illinois and no distinction is made between competitive and non-competitive traffic. The only coal not produced on the Missouri Pacific is a small quantity mined on the Denver & Rio Grande in Colorado for the Western division. Ninety per cent of the coal from Arkansas is mined by a subsidiary of the road and the prescribed coal, consisting of mine run less 25 per cent of the slack, is sold directly to the road at $2.75 per ton, which represents the cost of production. The other Arkansas coal is purchased from mines having traffic value at 15 to 25 cents a ton higher to allow a fair profit to the producer. A similar arrangement exists in Missouri. Kansas coal, not produced by the road's sub-

sidiary, is purchased from shippers at the $2.50 rate paid for company coal.

In Illinois, where 55 per cent of the road's requirements are produced, the road has a 10-year contract with one operator and a 5-year contract with another for coal from strip mines located exclusively on the Missouri Pacific at a flat price of $1.39½ per ton, while the rest of the Illinois coal is purchased from shaft mines at a price of $2.15 per ton. The latter coal, Mr. Vollmer stated, is allotted on the basis of previous commercial shipments of the operators, although spot purchases are occasionally made from firms on the basis of expected traffic. From the standpoint of use, he testified, no distinction is made between the Illinois strip and shaft coal and he agreed that if all the coal was purchased from the strip mines the difference between the two prices would be saved, but after explaining that all of the roads purchasing coal in that vicinity compare their prices, he insisted that the price paid for the shaft coal was the bottom price and added that even where, at the request of operators, certain sizes of prepared coal are taken in lieu of mine run, the same price is paid. Asked if the delivered cost of Illinois coal shipped into Arkansas was not cheaper than the price paid for Arkansas coal, he replied in the affirmative. He also stated that the policy was against waiving demurrage charges on distress coal, although saying he was aware that this had been done as shown by the correspondence.

In his testimony, C. E. Perkins, vice-president of traffic of the Missouri Pacific, took the stand that reciprocity in purchases was a traffic producer for the road and that this practice had resulted in more traffic. When asked where the additional traffic came from, he stated that he did not know, although agreeing that it must have been obtained from other roads. He stated his opinion to be that the purchasing department followed the traffic departments recommendations so far as practicable but disapproved paying a premium. The traffic value of firms is determined, he said, by keeping a card record of every shipper, showing the tonnage shipped every month.

Missouri Pacific Letters

Questioned about a telegram to an off-line coal dealer in which he stated "Effects your intensive solicitation felt. Increasing orders 3,000 tons next week. Keep up your good work.", Mr. Vollmer stated that the road uses its friends to get business, but added that the coal order was a purely seasonal increase and had nothing to do with the dealer's aid in traffic solicitation. Referred to complaints of coal dealers, including one to the effect that other roads named were purchasing more coal in proportion to the traffic given them, he said that such letters in the file were examples of the high-powered salesmanship the roads met in purchasing coal. He stated that, as brought out in the letters, he had recommended inserting a clause in certain coal contracts requiring the routing of the operator's commercial haul over the road in proportion to the coal tonnage the road was committed to buy, and explained that this was to insure commercial traffic in return for the haul from an operator whose mine was located on the Illinois Central, but that the clause was later abandoned as improper.

Questioned about certain letters relating to coal purchases from the Fleming Coal Company in which R. O'Hara, traffic manager of Swift & Company, was known to have been interested, he testified that R. O'Hara had talked to him "presumably with the traffic of Swift & Company in mind," but that the road's purchases from the Fleming Coal Company had nothing to do with traffic of the meat packers.

He was also asked about a letter telling the Franklin County Coal Corporation that he could not take additional coal that week because of the "large accumulation of coal under load and the insistence of the operating department against further accumulations" and a letter written two days later accepting coal from that company. He stated that this was a case of high-pressure salesmanship by the coal dealer and weakness on his part, as he had too much coal at the time. He said that in coal matters he was both a coal buyer and a freight solicitor.

He referred to several letters on the subject of demurrage charges involved in taking over distress coal and explained that the freight traffic managers had been permitted to take distress coal on their own authority, but that instructions had been issued on March 3, 1930, to correct the practice.

Coal and Steel Purchases

He was referred to a statement showing that purchases made with the Laclede Steel Company had increased from $42,436 in 1927 to $82,518 in 1928, and letters between himself and the general purchasing agent, including one written January 6, 1928, to Mr. Hopkins, in which he said:

> I would be pleased if you will make a personal trip over to the Laclede Steel Company and talk to their purchasing agent in an effort to influence him in buying their coal from a mine on our line in Southern Illinois—Use all the influence you have got to control this, so that the purchase order doesn't go to Kentucky or some mines our rails do not serve.

Subsequent letters showing that the Laclede Steel Company had ordered coal from mines on the lines and promised not to renew its contract for coal without discussing the subject with the general purchasing agent of the road. Mr. Vollmer was asked if the purchases had been increased to influence the coal purchases and whether traffic had increased as a result of the negotiations and replied that he did not know, although stating that the information was referred to the traffic department to follow up.

After having been referred to several letters dealing with complaints from a coal mining company over the few orders it received for the traffic it routed over the road in proportion to the orders obtained by another company for the traffic it gave the Missouri Pacific, Mr. Vollmer was asked if he would consider buying the entire output of a plant in order to get a lower price. He testified that it would not be doing right by the operators on the Missouri Pacific Lines to place all the purchases with one mine, but stated that the road might be able to buy cheaper from one mine on the basis of competitive bids than by spreading its orders.

He was also questioned about correspondence showing that while the road had contracted to buy a certain minimum and maximum amount of strip coal in southern Illinois at $1.39½ per ton, it bought considerable coal from the same mine through the selling organization for which it paid $1.75 per ton. He explained that at the time of opening the mine, which the Missouri Pacific had helped to finance in order to encourage the movement of commercial coal into Missouri Pacific territory, the operators had been delayed in starting production and it was understood that they would also receive orders on a pro-rata basis at the higher prices, which was done without requiring the mines to supply the road with the maximum tonnage called for under the contract.

Questioned about a letter in which a division superintendent had requested contractors to give a local cement company an opportunity to participate in supplying the cement for the jobs, Mr. Hopkins testified that the cement was not purchased locally and that the road dis-

couraged such purchases as not consistent with the recommendation of the traffic department.

Paint Buying

Mr. Hopkins was also asked about a letter in 1927 to Mr. Baldwin about paint and varnishes for new equipment in which he wrote, in part:

> Effective January 1, 1927, due to traffic conditions, and the fact that Sherwin-Williams was getting none of our lacquer business, and also that our operating people could learn of lacquers other than Duco, we awarded the lacquer business for Little Rock shops to Sherwin-Williams, and the quick-drying paint for Little Rock to Mountain Varnish Works, who are controlled by Swift and Willys-Overland interests. The Dupont Co. still have the lacquer and quick-drying paint at Sedalia, St. Louis, Kansas City and Hoisington, which totals about 60 per cent of our annual requirements. On the new passenger equipment recently purchased, Duco lacquer was specified on 58 out of a total of 70 cars ordered, 6 cars having Mountain Varnish Works lacquer applied, and 6 cars having Sherwin-Williams lacquer applied. In this connection, our traffic department were very anxious for us to do something more for the Mountain Varnish Works, and I believe you are familiar with the Sherwin-Williams situation.

He stated that the equipment committee had decided that Duco was giving the best results but that comparisons with other lacquers as well as traffic reasons had influenced the division of the order.

Questioned about letters in which he was reported to have made a visit upon instructions from the president, to a certain oil refinery in order to get back 300 cars per month which that company was routing against the road, he replied that while the company had not been on the inquiry list it secured orders after the conference.

He was also questioned about correspondence dealing with the troubles of the traffic department with the Lion Oil Refining Company growing out of the failure of the purchasing department to make a satisfactory fuel contract, and also to the alleged purchase of 200,000 barrels of the oil and subsequent contracts by the Rock Island. Mr. Hopkins stated that it was the policy of the road to buy oil as cheaply as it could and that this policy governed in the negotiations with the Lion Oil Company. The letters having contained statements to the effect that the Rock Island had offered higher prices "because its main consideration in buying the oil was the traffic involved," the vice-president of purchasing of the Chicago, Rock Island & Pacific was asked to appear before the hearing and explain the road's activities and policies in that district.

Mr. Hopkins was also questioned concerning correspondence which showed that culvert material received from a company which the traffic department had particularly desired to favor had proved to be an inferior product. He explained that arrangements had previously been made to allow considerably more latitude in the purchase of culvert pipe below 24 in. in diameter and he left the understanding that traffic had been considered in awarding the business.

Waste and Vegetables

On January 25, 1927, the A. F. Stanton Company, Chicago, addressed a letter to President Baldwin of the Missouri Pacific claiming the control of produce traffic and explaining that such traffic was being routed over competitive lines in consideration of orders for waste purchased from Meyer Bernstein & Son and concluding with the statement that at "some future date when your purchasing department sees fit to treat us the same way as we would have treated you, we will be glad to change our routing." Mr. Hopkins stated that he had heard it rumored that the waste dealer had paid from $1 to $5 per car for the traffic he claimed to control but said the road did not make any purchases of waste from this company because the prices were out of line.

He was also questioned about correspondence with the National Sanitary Rag Company, concerning the efforts of that company to sell its waste to the road in return for produce traffic which it claimed to control. It was stated that the company did not make its own waste but bought it from the Meyer Bernstein company, although it exercised some influence over the packing house products being shipped to restaurant operators from the Krey Packing Company and the St. Louis Independent Packing Company. Mr. Hopkins testified that the traffic the company claimed to control did not materialize and no purchases were made. The correspondence showed that the control of the Stanton traffic, previously referred to, was shifted from Meyer Bernstein & Son to the Chicago Waste Company which also claimed to influence the traffic of another produce shipper and that Meyer Bernstein & Son had become interested in the traffic of W. A. Richardson, another produce merchant, who immediately began soliciting orders for waste on behalf of Meyer Bernstein.

Cement Buying

Referred to correspondence in which one cement company protested against purchases shipped a considerable distance from an off-line company's plant, when the complaining company had a plant on the road within a few miles of the work, O. G. Parsley, freight traffic manager, explained that the order for the cement was actually placed with a plant on the line of the Missouri Pacific but was shipped from the off-line storage. He explained that this apparent irregularity did not represent the road's policy in making cement purchases, but agreed that the road had placed orders with another cement company in view of the large amount of traffic which the company had been withholding from the road, because of the road's failure to buy cement. Regarding other correspondence, Mr. Parsley explained the road began to spread its purchases in 1920 and when asked if the road was getting more freight as a result of it, replied in the affirmative.

Mr. Parsley's attention was also called to a letter by C. E. Perkins, vice-president of traffic, to E. M. Durham, Jr., senior vice-president, in which Mr. Perkins stated that in 1928 the traffic department had concurred with Messrs. Hopkins, Lauderdale and Garber in recommending that when present lubricating oil contracts expired on May 1, the purchasing agents merely ask the various companies to continue indefinitely to furnish oil as required at the old contract prices, thus leaving the road in a position "to shop our purchases around where it may do us the most good." He denied that the road's freight solicitors did have orders to exchange for traffic.

R. O'Hara and Commissary Supplies

The Missouri Pacific officers were also questioned concerning considerable correspondence relating to the road's relations with the St. Louis Independent Packing Company, Swift & Company and other packers. In June, 1927, a letter reported a conference held between the president of the St. Louis Clay Products Company and the president of the Whitehall Sewer Pipe Company with traffic officers of the Missouri Pacific, in which the president and other officers of the Packing company who were said to be interested in the clay products and sewer pipe companies threatened to route livestock movements of the Independent Packing Company against the Missouri Pacific because the road had not purchased certain of the contractor's materials for the Missouri Pacific's office building from the clay and sewer pipe companies. It was

reported in another letter to the St. Louis Independent Packing Company about the traffic problem that the Missouri Pacific, among other things, would at all times hold a supply of A.R.T. refrigerator equipment for its loading without any restrictions as to the routing and hold a switch engine at its disposal at all times and that it also purchased all of the meat used on its dining cars and at hospitals from that company through the Fisher Meat Company. Mr. Parsley was questioned about the switching and demurred practices discussed in some of these letters.

A subsequent letter written in June, 1928, reported that the dining car committee of the Missouri Pacific had considered the advisability of discontinuing its purchases from the Independent Packing Company "unless some pressure could be brought through to restore routing over the Missouri Pacific," and that the president of the Independent Packing Company had indicated his willingness to restore routing over the road if higher officers would pay him a visit, which was done by Mr. Baldwin, according to the letters, which contained the expression that Mr. Baldwin did not desire any of the meat business to be taken away from the Fisher Company. The correspondence showed that subsequently the contract of the Fisher Meat Company was transferred to a St. Louis hotel and supply company, a subsidiary of Swift & Company, as a result of the activities of R. O'Hara, freight traffic manager of Swift & Company. On May 7, 1927, R. O'Hara wrote a letter to O. G. Parsley, in which he said in part:

"When you were here on your last visit, you informed me you were going to place instructions that would result in a substantial increase in your purchases from Swift & Company for your dining car department. When will you find it convenient to do so."

Mr. Parsley replied in part as follows:

"I had the impression that Armour & Company were getting a considerably larger share than was your company, which was not correct as a check of six months ending March, 1927, shows that Armour & Company were paid $7,229 and Swift & Company $16,501. I think that you will agree that your company is being more fairly treated in the distribution of this class of supplies."

On May 26, 1927, R. O'Hara, writing again to O. G. Parsley, said in part:

"Our people feel that the Missouri Pacific is doing a very large amount of business with a jobber by the name of Fisher in St. Louis who is not responsible for the creation of any tonnage for your system."

On July 21, 1927, R. O'Hara also wrote O. G. Parsley:

"If you can let me have the figures you spoke about the other day with reference to the soap matter, we shall greatly appreciate it."

To this letter Mr. Parsley replied with a letter stating that he was enclosing for Mr. O'Hara's confidential information the bids which were filed by various concerns for toilet and brown kitchen soap. Subsequently Mr. Parsley received a letter from R. O'Hara requesting purchases of the road's glue requirements, in reply to which Mr. Parsley wrote a letter on October 1, 1927, in which he said:

"I will undertake to see that the order for our glue requirements will be restored to your company, everything else being reasonably equal. For your private information our present contract was awarded to the American Glue Company on the basis of 13½ cents while your company quoted 15 cents."

After repeated letters from R. O'Hara concerning the progress in increasing the dining car purchases from that company, which letters were received by the Missouri Pacific every few weeks over a considerable period, the contract for the dining car supplies, it was shown, was transferred to Swift & Company, following which the letters showed that complications arose in the form of protests from F. Ellis, vice-president of traffic of Armour & Company, who had not been informed of the change, although Armour & Company were stated to be much larger shippers of traffic over the Missouri Pacific than was Swift & Company.

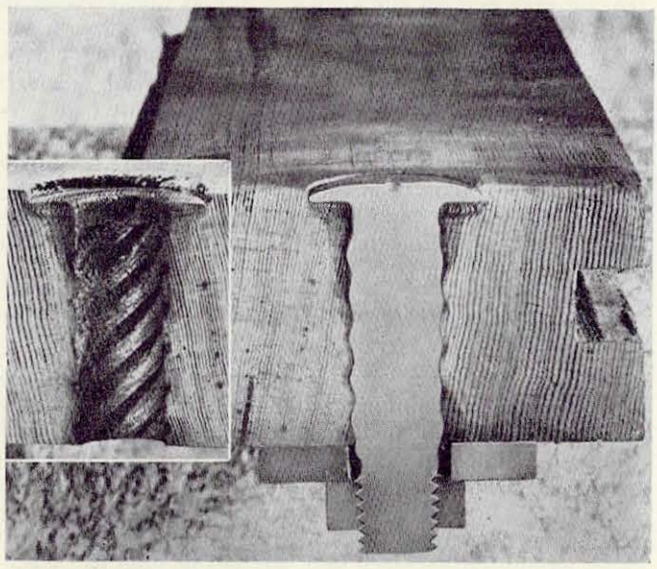
Included among other letters about which Mr. Parsley was questioned was a letter from H. A. Adams, traffic manager of the Edward Hines Lumber Company, soliciting purchases in behalf of the Forsyth Draft Gear Corporation, of which Edward Hines, president of the Edward Hines Lumber Company, was a stockholder.

Owing to space limitations, the report of the testimony of officers of the Missouri-Kansas-Texas, St. Louis-San Francisco and Wabash will be published in the next issue.

"Leak-Proof" Bolt

RECOGNIZING the importance of overcoming loss and damage claims occasioned by leaks in freight cars, the Grip Nut Company, Chicago, has developed and recently placed on the market a "Leak-Proof" bolt, which provides an improved means of bolting car flooring, siding, framing, and similar parts in place without any chance of water seeping in through the bolt holes. This freedom from water and dampness on the interior of the car structure and framing has a marked tendency to reduce damage claims and also promotes increased car life and lower repair costs.

The leak-proof feature of the new bolt is provided by designing it with a tapered shank, the length of the taper being equal to the thickness of the wood through which the bolt is applied. The tapered portion has left-hand, self-threading, spiral flutes, the smallest diameter of the flute at the root being equal to the diameter of the bolt at the outer end which receives the nut. The bolt holes through the wood are bored slightly larger in diameter than the outer end of the bolt, resulting in ease of application and a saving in labor since they are set in the wood with a finger fit without any effort. When the bolt is driven home, the spiral flutes cause the bolt to turn counter-clock-wise for one



"Leak-Proof" Bolt Applied in A.R.A. Standard Siding—Insert Shows Spiral Imbedded Effect

Perspective View of the New "Leak-Proof" Bolt—Patents Applied For

complete revolution. As a result, the spiral flutes form a thread in the wood in such a way that the wood fibres form a bond (under pressure) with the bolt shank at both the crest and in the valley of the thread, making a tight seal which is designed to prevent any moisture from entering the car through the bolt hole.

The Grip Nut Company has subjected this "Leak-Proof" bolt to service and laboratory tests for approximately two years, during which time the climatic and seasonal weather changes, together with their effect on the different kinds of lumber used in car construction, have been studied. The pressure of the wood fibres against the bolt shank has been regulated by the depth of the spiral flute, the degree of taper, and the thread angle, to a point where the leak-proof feature is said not to be lost, even under the maximum shrinkage of the wood.

The head of the bolt is made substantially flat, and, being slightly concave on the under-face, it draws into the wood a sufficient distance to give a smooth interior surface in the car without the necessity for countersinking the bolt head. This head is designed to eliminate the rough and broken fibres, "whiskers", and sunken cups caused by pulling the common types of flat bolt heads into the wood. On account of the left-hand spiral flutes being opposed to the direction in which the nut is turned on, no additional holding device is required to prevent the bolt turning in the wood when the nut is tightened.

The illustrations show clearly the construction and advantages of this entirely new form of bolt. One view is a perspective of the bolt, alone, and the other shows the bolt applied to an A.R.A. standard side-sheathing board. The board and the bolt are carefully sawed in two pieces, one-half of the bolt being left imbedded in the wood. The insert shows the spiral-imbedded effect made by the bolt in the other half of the wood.

"Leak-Proof" bolts are available in all diameters and lengths commonly used in car construction and repair work. In addition to the uses mentioned, the bolts are suggested for holding refrigerator-car framing and flooring, stock-car side slats, and running boards on all classes of cars, especially tank cars. They may also be used to advantage for bolting bridge and other timbers, particularly when treated.

The design of the new bolt gives an unusually rigid connection and, when used to hold two pieces of wood together, tends to prevent any movement of one on the other. This eliminates the underlying cause of all body squeaks, opening up a new and potentially large field for use of the bolt, entirely aside from its real function of promoting dry ladings and at the same time saving in both car construction and maintenance costs.

Patents have been applied for on this new type of bolt.

Emergency Board Finds Wage Cut Unjustified

WASHINGTON, D. C.

A FINDING that the Louisiana & Arkansas was not justified in reducing the wages of its shop craft employees in February, and that it should restore the standard rate and its former rules governing working conditions or submit to arbitration, was made by the emergency board appointed by the President in April to investigate the situation after the employees had voted to strike. The board also found that the action of the carrier in putting into force important new rules and working conditions "wholly without notice" as required by the railway labor act, "was positively illegal," and said that if the company continues to refuse to restore former conditions or arbitrate it "can not urge upon the craftsmen the duty of agreeing to the conditions, partly illegal, imposed by the action of February 9, 1931." This report was dated May 5 but was not made public until July 9, pending efforts by the President and the Board of Mediation to persuade the management to conform to the views expressed by the board. It is reported that these efforts included a summoning of the president of the Louisiana & Arkansas, Harvey C. Couch, to the White House for conference with President Hoover on the subject.

While the views expressed by the board, Charles Kerr, Chester H. Rowell and Homer B. Dibell, were based on a finding that there was nothing in the financial condition of the L. & A. to justify the reduction in the basic wage rate of 5 cents an hour, except for helper apprentices, who were reduced 3 cents an hour, the report also includes general language criticizing the road for making "the first break" in "the general and agreed policy of the railroads of the United States" to maintain wage scales, as announced from the White House on November 21, 1929. For this reason the report has attracted unusual interest in view of the contention so frequently made by those opposing the rate advance asked by the railroads that they should first have sought to reduce wages. After a detailed statement of the facts the views of the board were summarized as follows:

Views Summarized

(1) There was nothing in the financial situation of the carrier, nor other conditions affecting it, which justified its action of February 9, 1931, in reducing the rate of wages of its shop crafts below the standard prevailing over the country; and the evidence tends to show that when conditions become fairly prosperous the carrier which acquired the two roads will find that its acquisition of them will be exceedingly profitable.

(2) The action of the carrier of February 9, 1931, in putting into force new rules and changes in working conditions, wholly without notice such as is required by the Act, was positively illegal under section 6.

(3) The refusal of the carrier to submit to arbitration under the Railway Labor Act upon the announced and only asserted ground that there was nothing to arbitrate was not justified. If there was an occasion for a change in the rules, and there may have been, there was clearly an arbitrable controversy, and their promulgation without notice to the men or their representatives was in direct violation of the Act.

(4) That the policy announced in the statement of the President of November 21, 1929, after conferences with employers and employees, to the effect that there should be no wage reductions made by employers and no efforts by the men to increase the standard wages, was observed faithfully by other carriers, with a few negligible exceptions, to which we attach no importance. The men observed the spirit of the statement and went beyond it in not pressing the reserved right to continue negotiations then pending.

(5) The carrier should restore the standard rate of wages and rules governing working conditions prevailing on its line in September, 1930, when it first proposed changing them. This would leave the carrier and the men as they were when the carrier announced its purpose to reduce wages and change the working rules. The conclusion we reach is based upon the proposition that there was never an occasion for reducing wages, though the right to do so in the manner provided by law is conceded by all, and the further proposition that the change in rules and working conditions without notice was positively illegal under Section 6. Rules arbitrarily imposed by the carrier without negotiation with the men or their representatives have no element of contract and are not in harmony with the thought of Congress expressed in Section 2 imposing the duty "to make and maintain agreements concerning rates of pay, rules and working conditions."

(6) That if the carrier refuses to restore former conditions it should submit to arbitration. The men have expressed their willingness to arbitrate notwithstanding the illegal change of rules.

(7) That if the carrier refuses to do one or the other, that is to restore conditions as they were in September, 1930, or to arbitrate, we can not urge upon the craftsmen the duty of agreeing to the conditions, partly illegal, imposed by the action of February 9, 1931. This would be equivalent to saying that one who obeys a particular law is at a disadvantage with respect to one who disregards it.

(8) We feel that the carrier should not disturb the wage structure which other carriers, no better situated, are maintaining; and that it should seriously consider whether it can justify itself to itself in maintaining rules and working conditions fixed in a way declared by Congress to be illegal.

(9) If the opportunity is offered the carrier to mediate or arbitrate the controversy it should accept it; and if not presented it should seek it.

The Louisiana & Arkansas, according to the report, submitted to the board "recast" figures of its income and expenses which it claimed indicated a financial situation so urgent as not only to require this reduction of wages of the shop men without delay, but also to justify its refusal to arbitrate the question, but the board said that the recast figures eliminating "non-recurring" income and certain bookkeeping entries not representing current cash receipts did not in all cases make similar allowances for non-recurring expenses. The company's calculations purported to show an actually realized net income for 1929 of $360,289, which fell in 1930 to $72,095 and in the first three months of 1931 to $2,362 as compared with $116,096 for the corresponding months of the preceding year. But, the board said, the reports to the Interstate Commerce Commission, under its accounting classifications, "present a different result." The official figures show a net railway operating income of $1,343,838 in 1929 and of $1,264,387 in 1930 and the board adds:

"The practical fact is that this company since consolidation of the Louisiana & Arkansas and the Louisiana Railway & Navigation Company in 1929) has paid interest in full on the bonds issued against a property which had never paid interest before, and dividends in full on its non-cumulative preferred stock, the predecessors in ownership of which, we understand, never drew dividends, even if earned. These two classes of securities together cover $18,000,000 of the $27,000,000 I. C. C. valuation of the properties plus additions and betterments. On this whole valuation the net earnings by the I. C. C. accounting system have approached the limit of the recapture clause of the Transportation Act."

History of Dispute

The report discussed at length the history of the dispute and of the efforts of the Board of Mediation to settle it, saying that the company gave notice on September 15, 1930, of its desire to revise the wages and working conditions, that members of the Board of Mediation notified it of the willingness of the employees to accept a reduction temporarily pending arbitration, but that the company refused and that after it had requested the board to terminate its efforts toward mediation it had posted the reduction in wages from 80 to 75 cents an hour and a number of important changes in rules of which there had been no previous notice, effective immediately. A strike vote was then taken, 179 employees voting "yes," 29 "no" and 16 blank, and Chairman Winslow of the board renewed efforts to induce the management to agree to arbitration. The report says that the appointment of the emergency board on April 16 automatically suspended the strike but did not, in this case, operate in practice to restore the status quo on the wages and working rules over which the dispute had arisen. "The company having put these changes into effect after the 'final' act of mediation and before the creation of the emergency board, claimed that the conditions so created in that interval now constitute the status quo," the report said. "This question raises a new and important question, both of law and of policy, as to the operation of the Railway Labor Act."

After the close of hearings by the emergency board it again urged, in conference with representatives of the carrier, that it either agree with the men or submit the case to arbitration but "this suggestion, like the previous ones of the Board of Mediation, was met with courteous but unconditional refusal."

As to the changes in rules which had not been previously discussed, the board says, "these, at least, being made without notice, we are confident are void *ab initio*, and their abrogation under the decision of the Supreme Court of the United States, in Texas & N. O. R. Co. v. Brotherhood, 281 U. S. 548, could be enforced by injunction by a court of equity."

Before the consolidation, the shop craft employees of the L. R. & N. had been receiving a basic wage of 70 cents and those of the old L. & A. of 75 cents an hour. In 1929, by agreement or by arbitration, the wage scale of these crafts on railroads generally throughout the United States had been fixed at 80 cents an hour. After consolidation, the same scale was put into effect on the new L. & A., resulting in an increase of 10 cents an hour for one group and of 5 cents an hour for the other group of its employees. "Even through the present period of depression," the board said, "this 80-cent rate has remained and still remains, the standard rate for railroads generally, and with the exception of a few short line railways of negligible importance, there has been no proposal or attempt anywhere to break down this scale, until the action of the carrier in this case.

"It appears from the evidence that the carrier has been able to spend large sums out of surplus for the rehabilitation of its recently acquired property and at the same time to pay not only interest, but dividends on preferred stock. It is a matter of common knowledge that there are systems in the United States in real distress, in default on their bonds, and in the hands of receivers, which are nevertheless continuing these wage scales unimpaired. This is, in fact, the general and agreed policy of the railroads of the United States, in the present crisis, of which the action of this company is the first break.

"In spite of the long continuance and severity of the depression, this policy we find has been carried out faithfully on both sides. With the negligible exceptions above mentioned, no railroad, until this carrier, has sought to abrogate its wage agreements with the employees' organizations. On the side of labor the policy has gone even beyond that announced from the White House. Not only have no movements been initiated for increases of wages, but even those already in negotiation, in which

freedom of continued action was reserved, have not been pressed. The result has been that the nation has gone so far through a major depression without a single important strike, and with very few minor ones. In the railway industry there have been no strikes at all, or threats of strike until this company, by an action in which it happily stands alone among American railroads, took the action precipitating the crisis which caused the Presidential Proclamation appointing this Emergency Board."

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended July 4 amounted to 667,879 cars, a decrease as compared with the week before because of the holiday, but considerably closer to the figures for the corresponding weeks of the last two years than has been reported for some time. As compared with last year this was a decrease of only 124,174 cars and as compared with 1929 it was a decrease of 243,264 cars, whereas in the previous week the loading was 337,279 cars less than in 1929. The principal reduction as compared with last year was in miscellaneous loading, which was 55,381 cars less than in 1930. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, July 4, 1931

Districts	1931	1930	1929
Eastern	149,789	173,240	202,160
Allegheny	125,274	161,416	194,379
Pocahontas	41,146	41,930	46,555
Southern	93,111	105,275	118,932
Northwestern	90,684	122,695	143,366
Central Western	111,760	122,837	136,294
Southwestern	56,115	64,660	69,457
Total Western Districts	258,559	310,192	349,117
Total All Roads	667,879	792,053	911,143
Commodities			
Grain and Grain Products	47,691	48,205	52,524
Live Stock	14,886	16,694	20,283
Coal	101,114	109,659	120,133
Coke	4,576	8,555	11,884
Forest Products	24,895	36,377	50,116
Ore	29,919	56,033	66,789
Mdse. L.C.L.	188,486	204,837	224,368
Miscellaneous	256,312	311,693	365,046
July 4	667,879	792,053	911,143
June 27	759,290	936,690	1,096,569
June 20	739,116	920,645	1,069,874
June 13	732,453	926,066	1,069,670
June 6	760,890	935,582	1,055,768
Cumulative total, 27 weeks	19,647,863	23,992,629	26,528,096

The freight car surplus for the week ended June 30 averaged 599,282 cars, a reduction of 29,272 cars as compared with the week before. This included 306,443 box cars, 244,120 coal cars, 30,510 stock cars and 13,695 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended July 4 totaled 43,545 cars, a decrease of 6,793 cars from the previous week and a decrease of 11,435 cars from the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
July 4, 1931	43,545	24,179
June 27, 1931	50,338	23,817
June 20, 1931	51,988	23,187
July 5, 1930	54,980	28,115
Cumulative Totals for Canada		
July 4, 1931	1,301,301	744,142
July 5, 1930	1,585,844	949,127
July 6, 1929	1,770,184	1,144,778

I.C.C. Tentative Values Adjusted Total $21,691,000,000

WASHINGTON, D. C.

ALTHOUGH the Interstate Commerce Commission is entering upon another general rate advance case without a valuation of the railroads conforming to the decisions of the Supreme Court, that fact is not deterring it from using as evidence in the rate case valuation figures compiled according to the theory which it has sought for years to establish and which was condemned by the court two years ago in the O'Fallon case.

A statement of its "tentative final values adjusted to December 31, 1930," making a total of $21,691,000,000, is included in a compilation of railway financial and operating statistics made public by the commission on July 11 "as possibly being of service in the consideration of the issues" in the rate case, with a statement that it was expected that such data would be introduced as an exhibit at the initial hearing. This figure was not given out as representing a valuation of the railways, as generally reported in the daily press, but as a comparison in parallel columns with a statement of the "net book value" of the railways. After deduction for accrued depreciation and without working capital, this was given as a total of $23,518,000,000. The net book value was then distributed according to the district proportions of the tentative values and restated in another column with the addition of an allowance for working capital, a total of $24,078,000,000. The tentative valuation figures were adjusted, according to a footnote, on the basis of annual reports, which means that they represent approximately the O'Fallon basis of adding net new investment to the old primary valuations at 1910-1914 prices. The table follows:

Net book value (adjusted) by districts, 1930 Class I railways and non-operating subsidiaries. (Includes switching and terminal companies).

	Millions of dollars			
District	Net book value Dec. 31, 1930* without working capital (1)	I. C. C. tentative final values adjusted to Dec. 31, 1930 ** (2)	Column (1) distributed according to district proportions of column (2) (3)	Column (3) plus working capital *** (4)
Eastern district	9,565	9,318	10,103	10,370
Eastern district including Pocahontas region	10,631	10,278	11,144	11,432
Southern district	3,955	3,758	4,075	4,158
Southern district, excluding Pocahontas region	2,889	2,798	3,034	3,096
Western district	9,998	8,615	9,340	9,550
All districts	23,518	21,691	23,518	24,078

* Accounts 701 and 702, investment in road and equipment, less accrued depreciation, accounts 775 and 776. Includes certain property in Canada operated by United States railways.

** Adjustments based on annual reports.

*** Working capital based on the ratio of working capital to operating expenses obtaining in the year of valuation.

It is understood that the commission's valuation forces are now engaged in making a tentative valuation total using current price levels, for use in connection with the rate case, and much work of this kind has been done in connection with the preparation of tentative recapture reports, of which many have been issued on the basis of an average of estimated original cost and of cost of reproduction, less depreciation. Meanwhile, however, the commission apparently intends to continue to "consider" valuation figures made on the old basis, in comparison with the property investment figures used by the railways, just as it has done in rate and other cases for many years without indicating how much weight it has attached to them.

The figures made public are an indication of the kind of valuation the commission would have placed on the

railroads if the Supreme Court had held otherwise in the O'Fallon case and of the "rate base" which a majority of the commission recommended that Congress approve by a revision of Section 15a, in the report sent to the Senate committee in January. Therefore the commission will be able to "take into consideration" the $21,691,000,000 figure as a rate base just as if Congress had changed the law in the way it recommended, unless and until it gets a better figure.

In this connection it may be recalled that the commission also included in its proposed substitute for 15a a provision as follows: "The fact that such aggregate net railway operating income falls below such amount (fair return) in times of economic depression or rises above it in times of economic prosperity shall not necessarily be regarded as a reason for raising or reducing rates."

Valuation is hardly expected to be the important issue in this rate case, since the net railway operating income of the railways in the first five months of this year, $188,387,589, was at the rate of only 2.1 per cent on their total property investment of $26,835,000,000 and would be only about 2.7 per cent on the tentative valuations as adjusted. Moreover, the commission has several times stated that the railroads have never had a fair return even on its own basis of valuation. In their application the railways said that their net for the first four months was only 2.24 per cent on the tentative valuation of $18,900,000,000 used in the 1920 rate case as adjusted to date, and that even the rate increase sought would allow them less than 4 per cent on the basis of 1930 traffic. According to the commission's compilation about 32 per cent of a year's net should be earned in the first five months of the year and on this basis the net for 1931 would be about $587,000,000.

The figures in the tentative valuation reports were adjusted to date on the basis of the annual reports, which are handled by the commission's Bureau of Statistics. The Bureau of Valuation forces are working night and day on a similar adjustment on the basis of the returns made by the roads to the bureau's Order No. 3 and at the same time they are collecting all available data on current price trends by districts with a view, it is understood, to applying them to the inventories in the form of "period prices" such as have been used in the recapture reports for years up to 1927. This method would produce a total considerably higher than the aggregate of the tentative values as adjusted and would probably support the results obtained by the use of the property investment basis if it did not produce an even higher total.

The commission also included in its compilations a table "to show that the fixed charges, or deductions from gross income, are not all chargeable against operating income." This showed the 1930 non-operating income other than equipment and joint facility rents as $358,886,237, while the deductions from gross income other than equipment and joint facility rents, amounted to $703,864,399 and the difference, or the amount to be met from operating income, was $344,978,162. However, it was explained in a footnote that the last figure is misleading, unless it is taken into consideration that the non-operating income includes the dividends and interest received by one railway from another.

The compilation made public by the commission includes traffic statistics, revenues, expenses and income, maintenance expenses, wage statistics, balance sheet items, and unit revenues and costs by years back to 1910 or 1920, and in some cases including five months of 1931, but in others going only as far as 1929. The traffic statistics included a table showing that while in 1911 the ratio of passenger miles to freight ton-miles was 13.1 per cent, and in 1921 was 12.2 per cent, the ratio has fallen to 7 per cent in 1930.

The wage statistics show that while the average hours per employee decreased from 3,150 in 1916 to 2,527 in 1930 the average compensation per hour has increased from 28.3 cents in 1916 to 67.6 cents in 1920 and 67.8 cents in 1930. The annual compensation per employee increased from $891.62 in 1916 to $1,820.12 in 1920 and has been gradually reduced to $1,714.39 in 1930. The latter figure compares with $1,744.03 in 1929 while the average compensation per hour increased from 66.6 cents in 1929 to 67.8 cents in 1930, apparently because the reductions in forces affected particularly the lesser paid employees.

The table of unit revenues and costs shows a deficit of .169 cents per passenger train car-mile in 1928 and of .586 cents in 1929 after deduction of operating expenses, rents and taxes from the revenues.

A compilation based on the commission's tentative valuation used in the 1920 rate case, plus net additions and betterments, was also put into the record on behalf of the railways by Dr. Julius H. Parmelee, director of the Bureau of Railway Economics, in his opening testimony. This arrived at a total of $24,566,756,055 at the end of 1930. The difference between this figure and that of the commission is doubtless explained mainly by the latter's deduction for depreciation. For the Eastern district the total was $11,514,182,239; for the Southern region, $3,024,711,207; and for the Western district, $10,027,862,609.

Extension of Parcel Post Service Approved

WASHINGTON, D. C.

OPPORTUNITY for additional experience of governmental competition with private business was afforded by the decision of the Interstate Commerce Commission made public July 10 giving its consent to the proposals of the Postmaster General to increase the limit of size of parcel post packages from 84 to 100 inches, length and girth combined, and to increase the limit of weight of single parcels from 50 to 70 pounds for deliveries to parcel post zones 4 to 8, inclusive, which include distances of 301 miles or more. The commission also approved the establishment of a minimum charge for parcels measuring over 84 inches at the zone charge for a 10-pound parcel.

These changes, which were proposed in connection with the proposal to increase the parcel post rates for the lower zones and smaller packages and to reduce the rates for the longer hauls and larger packages, were vigorously opposed by the express companies as calculated to divert traffic from the express service to the postal service. They were considered, however, apart from the rate proposals on which hearings have not been concluded. When the parcel post was first established it was limited to 11-pound packages but the size and weight has been gradually extended.

All of the proposals were made primarily for the purpose of obtaining increased revenue from the parcel-post service to offset in some measure the computed deficit therein which, according to the cost ascertainment made by the Postoffice Department, has existed for several years. The deficit for the fiscal year 1930, as thus indicated, was $15,570,730; for 1929, $19,778,706;

for 1928, $7,039,930; for 1927, $4,479,585; and for 1926, $2,959,733.

Representatives of mail-order houses and of the American Farm Bureau Federation urged that opening the mails to the larger-sized packages and the extension of the 70-pound limit to the more distant zones would be of benefit to the postal service and to the mail users.

Under the act of August 24, 1912, effective January 1, 1913, the weight limit was fixed at 11 pounds and the size limit at 72 inches, length and girth combined. Effective August 15, 1913, the weight limit was raised to 20 pounds for the first and second zones. Effective January 1, 1914, the weight limit was raised to 50 pounds for the first and second zones and to 20 pounds for the other zones. Effective July 10, 1915, the size limit was increased to 84 inches. Effective March 15, 1918, the weight limit was increased to 70 pounds for the first three zones and to 50 pounds for the other zones. The 70-pound limit has not been extended because at the time the limit was fixed it was considered that the capacity of the service would not permit handling heavy parcels for any greater distance than 300 miles, the limit for the third zone. It is now stated that the capacity of the service is such that the increased business anticipated from the proposed increases in weight and size can readily be handled without an undue increase in expense, and that the increase in revenue will be sufficient to warrant the establishment of the service. It is estimated by the department that the gross revenue will be increased $5,000,000 as the result of the increase in limits. Of this amount, $1,500,000 is attributed to the increase in the weight limit. These estimates are based upon the proposed changes in rates.

The chief objections were made by the express companies. They contended that the present limits are higher than those required by a reasonable parcel-post service and that they are in a large measure responsible for the deficits. They also stated that a large part of the parcel-post traffic is competitive with express and that a considerable portion consists of traffic diverted from the latter by the gradual extension of the size and weight limits. Further extension, it was contended, will result in further diversion of long haul, heavy, and bulky traffic.

"As to the fact of competition and diversion of traffic there is no doubt," the commission said. "The extent of the diversion is another matter. No adequate figures as to this are available. It is not possible on this record to approximate how much of the present express traffic might be affected by the proposed changes. The express companies have not made any extensive study of their own service to determine the extent to which packages weighing from 51 to 70 pounds are now handled by them to destinations within the parcel-post zones where the increased parcel-post weight limit is intended to apply. A single test was made covering express shipments forwarded from New York City on December 27, 1930, to 47 representative cities throughout the United States. It does not afford a factual basis for any prediction as to whether or not there would be a material diversion of traffic as contended by the express companies. From other data of record it might be concluded that the increase in weight limit, apart from other factors, would result in little if any diversion of traffic.

"It was testified on behalf of the Department that only a few parcels weighing over 50 pounds are now carried for delivery in the first three zones. It is stated that parcels weighing over 50 pounds that probably would be mailed to the zones beyond the third if the weight limit were increased to 70 pounds would be a smaller per cent of the total than the per cent shown for the first three zones because of the greater postage charges and the fact that such charges more closely approximate the charges for service by express. From exhibits of record it is shown that in 1928, the total of all parcels handled was 751,980,239 Of this amount, 210,835,775, about 28 per cent, moved to zones beyond the third. Of this 4,917,519 parcels, or 2.33 per cent, weighed from 21 to 50 pounds. Upon the basis of these figures and under existing rates, an extensive movement to zones 4 to 8 inclusive, of packages weighing over 50 pounds does not appear to be probable.

"The increase in size limit from 84 to 100 inches, aside from changes in rates, is relied upon to bring in the greater portion of increased revenue. It is not considered likely that parcels over 84 inches would weigh less than 10 pounds, so that packages of all weights from 10 to 70 pounds would be affected. Many packages now within existing weight limits are barred because of the size restriction. A large number of these probably would be sent by parcel post if the size restriction were removed. There are no data of record from which to estimate how great an increase in the number of shipments there would be. The Department estimated that the probable increase in revenue would be about $3,500,000. There is no estimate as to the amount by which the cost of performing parcel-post service might be increased as a result of handling parcels of greater size.

"The Department states that a considerable increase in parcel post shipments will result from the extension of the size and weight limits; that the facilities of the service are adequate to handle it; that the additional expense to be incurred will not be excessive; and that a sufficient increase in revenue will result. There is sufficient evidence to show that the position taken by the Department is justified, at least to an extent which would warrant trying out the effects of the proposed extensions. The lack of additional evidence does not in this instance furnish substantial ground for withholding our consent."

The Postoffice Department announced after the decision that it has started an intensive campaign "to make the American people parcel-post-minded." A plan of education has been mapped out by postal officials which, it is hoped, will result in a much more extensive use of the fourth class mail privileges. The first step in this direction has been the appointment of parcel post supervisors at 60 of the largest postoffices throughout the country. It will be the duty of these officials to come in contact with the public, to offer suggestions to shippers and to hear complaints with a view to increasing the use of the parcel post mail facilities. A parcel post rate guide has been prepared and will be in possession of the local postmasters at those centers for distribution to all mailers.

THE NORFOLK & WESTERN MAGAZINE is planning to create "a complete transportation library," and has asked the cooperation of the railroad's employees in building up a collection of suitable reading material. Such material should be on the general subject of transportation; specifically, "books or pamphlets covering history as it is related to transportation, geographical studies, maps, statistical information about the various transportation agencies in the United States, cities, counties and ports served by the railroad, information about railroads in foreign countries, engineering information, and books or pamphlets dealing with any subject related to railroad motive power, traffic, maintenance and operation." Although intended primarily as a reference library, "eventually, any of the books may be taken out for a limited period by any N. & W. employee."

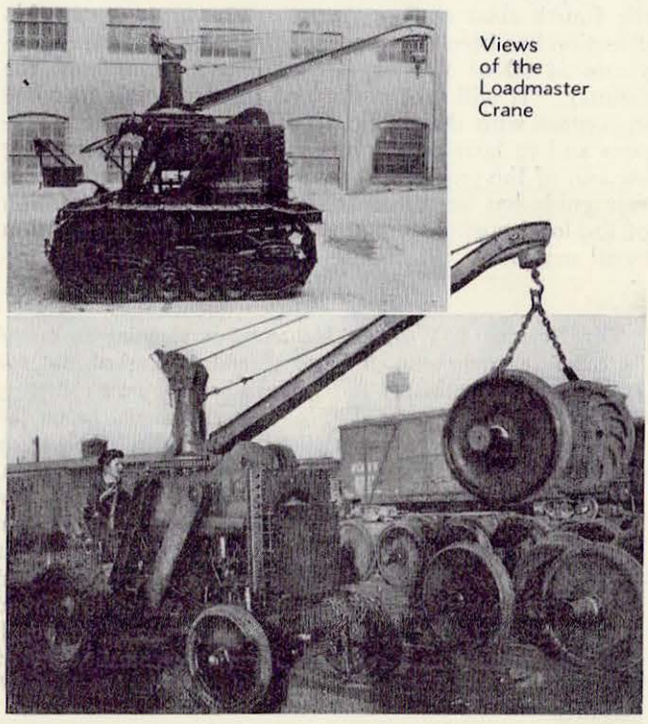
A Crane Tractor for Close Quarters

THE Bucyrus-Erie Company, South Milwaukee Wis., has begun the construction of the Loadmaster crane, which has already appealed to several railroads as a useful combination of hoisting machinery and tractor equipment for work around railroad storehouses, shops, etc. The machine is a heavy-duty industrial tractor, equipped with a revolving crane and mounted on rubber-tired wheels, or Trackson crawlers. For special work, it can also be equipped with a 160-cu. ft. air compressor.

Compactness is secured by mounting the crane on top of the engine, where the boom is raised or lowered and swung in a complete circle by power. Both movements are controlled from the driver's seat. The standard 10-ft. boom has a rated capacity of 3,500 lb. and a lifting height of 12 ft. 4 in. under the hook, although the reach can be increased to 16 ft. by using a longer boom. The overall width of 65 in. and the overall length of 120 in. make it possible to turn the machine in a short radius. The overall height of 8½ ft. from the ground allows it to operate through doorways.

With the turret-type boom, hoisting can be performed without turning the tractor, while the high base of the boom offers no interference to the operation of the machine as a tractor in pushing or pulling loads and facilitates operations in close quarters. The latter feature is especially advantageous in handling loads in and out of cars from the ground level. The machine is capable of traveling 11 m.p.h. when equipped with wheels, while the crawler tractor is adapted for heavy-duty operation over soft and uneven ground, the weight being distributed so that the crawlers will assure traction under heavy drawbar pulls. The machine, equipped with an air compressor, dispenses with the inconvenience of handling unwieldly lengths of hose.

The Missouri Pacific has eight of these cranes in use at the present time, having installed them at small shop points where a single skilled operator serves all departments in pulling trailers, loading and unloading materials and scrap around the stores, mounting air pumps, side rods and tires in the roundhouses, and handling couplers, scrap and lumber around the repair tracks. The illustration shows one of these machines in service on the Missouri Pacific at Dupo, Ill.



Views of the Loadmaster Crane

Transport Co-ordination In The Event of War

WASHINGTON, D. C.

ASSUMPTION by the federal government of possession and control and actual operation of transportation systems in the event of another war should be only a last resort, Clyde B. Aitchison, of the Interstate Commerce Commission, testified before the War Policies Commission on May 18 in a statement of his individual views as to war transportation policies, which he said had been made without submission to or approval by the commission. Mr. Aitchison submitted to the War Policies Commission the results of a comprehensive study he had made in review of the causes which brought about federal control in 1918 and 1919 and of the greatly changed conditions since, from which he drew the conclusion that "it is not probable that any emergency condition now within range of vision would call for any such degree or similar kind of federal control as was required during the late war." Since the war, he said, there has been a marked betterment of the transportation machinery provided by law for the handling of emergency transportation situations, that machinery has been tested under conditions of great stress and found to be workable, and "economic changes which have been so forceful as to amount to a second industrial revolution are still in progress." A summary of his conclusions follows:

To put the experiences of the late war to profitable future use we must consider the circumstances, legal and economic, which applied then, and weight them to compensate for the many subsequent changes.

In looking to the future in terms of past experience we must recognize the great increment to the transportation plant of the country in the last 14 years. (1) There have been marked increases in the efficiency and size of the operating plant of the railways; (2) the water tonnage has increased both in foreign and domestic service; and inland waterways which were hardly more than projects have become actualities; (3) the incredibly rapid development and widespread use of motor truck and auto bus service, upon a highway system enormously expanded and improved since 1917; (4) the advent of the aeroplane as a commercial factor; (5) the development of the system of pipe lines conveying oil or gas, and petroleum products; and (6) the long distance transmission of electric power. These facts have the effect of either increasing the capacity of the railroads' plant, or of taking away from it huge amounts of traffic which but a short time ago could move only by rail. It seems inconceivable that the railroads can again be subjected to such a strain as was put upon them in 1917.

The entire lack of training of industrial personnel and management in meeting such emergency conditions as we faced in 1917 was a decided factor in the then inefficiency and resulting confusion and congestion. Attempts to meet the emergency trained the personnel and management of carriers, of shippers, and of the administrative branch of the government as well.

Premising these greatly changed conditions, it is not probable that any emergency condition now within range of vision would call for any such degree or similar kind of federal control as was required during the late war. If a military emergency should come, we know that the more that cooperation in service assimilates itself to unification, the less will be the cost and the more efficient will be the service, and the less the disturbance of usual economic relations in the country. Unification should be sought as soon as the emergency arises. To permit prompt and unhesitating action, war carriers or shippers should not be subject to the penalties of the antitrust acts for things they do in response to the emergency request or demand of the President or other agency of the government.

At as early a stage in the emergency as possible, an officer or agent should be designated by the President, with functions which might be termed those of a Director General of Transportation. He should carry the authority of the President and Commander in Chief; he should act as the coordinating agent between all branches of the military and civil establishments, and carriers of all descriptions,—rail, water, highway, air, or pipe line,—individually or collectively, so far as transportation is concerned and as may be deemed necessary. To that end he should be able to formulate the problem set to be met by the carriers and by the regulatory bodies, federal and state, and he should speak responsibly and definitely as to where the public interest lies in respect of transportation, and as to production and distribution, so far as affected by transportation.

Three distinct courses would be open to the President as Commander in Chief to coordinate the agencies and resources of the government and of the carriers:

1. Utilization of the existing agencies provided by law, particularly by the use of his own statutory powers as to the order of priority through his Director General of Transportation and by use of mandatory expanded emergency powers of the commission in the execution of the plan. Exercise of these powers may be supplemented by such voluntary cooperation through organizations of carriers as he accepts.

2. Acquisition of possession and control under the Federal Possession and Control Act, and exercise of control in a manner which falls short of actual government operation, as to selected carriers or groups of carriers, or to an extent limited so as not to oust the owners from the beneficial occupancy of their properties.

3. Assumption by the President of possession and control and actual operation of particular systems of transportation or of all transportation systems.

Of these possible courses, the first is the most desirable. The second course, of limited possession and control, should not be entered upon if utilization of the existing laws or agencies will meet the emergency; and the third, full possession and operation, should be a last resort.

To minimize direct expense to the government control should be exercised under the regulatory power as far as possible, rather than by actual appropriation of property or of the beneficial use thereof under the war power. No formal guaranty of earnings or awarding of just compensation would be necessary unless what was done was equivalent to a taking of the property.

Financing the needs of the carriers may be accomplished as was done during the transition period following federal control. There was then created a revolving fund from which loans were made to necessitous carriers upon the certificate of the commission as to public interest and adequacy of security. It is not wise that a railroad finance corporation should seek to raise large sums in competition for funds with the government.

No opinion is expressed as to the adequacy of the existing machinery for the adjustment of wage disputed between carriers and their employees.

Some modifications of existing laws are desirable so that they may be available promptly if an emergency should occur.

1. The federal possession and control act of August 29, 1916, should be clarified so as to avoid uncertainty as to what is meant by "any system or systems of transportation" which the President takes under federal possession and control.

2. The commission should be permitted in time of war, with or without hearing, to authorize the pooling or division of traffic or earnings, regardless of the effect upon competition. The present law requires as a condition precedent that competition shall not be unduly restrained. Exigencies of war may require competition to be done away with for the time.

3. In time of war or threatened war the commission should have a summary power as to rates, similar to its emergency powers as to service and routes, so that it may promptly fix emergency rates limited to a period to be declared by the commission. The resulting rates should be subject to review and correction upon a complaint or investigation on the commission's own motion, as in the case of rates established by the carriers in usual course.

4. The definition of "car service" and the scope of the interstate commerce act should be broadened so as to include other forms of transportation service in time of war or threatened war, and "carrier by railroad" should be made to include other kinds of carriers than railroads, so that the emergency powers of the commission as to service may cover all forms of interstate transport.

Such broadening of power should be limited to the emergency period, evidenced by appropriate legislative or executive proclamation under authority of law. No opinion is now expressed as to what the peacetime policy should be in this particular.

5. Power should be vested in the President, in time of war and for a brief transition period thereafter, enabling him to readjust functions as between various executive and administrative departments and agencies of the government. This was done by the temporary Overman Act of May 20, 1918.

* * *

Major-General Sir Henry W. Thornton, President of the Canadian National, Reviewing the 79th C. N. R. Battery, Canadian Artillery, at the Cenotaph, Montreal, Que.

Books and Letters . . .

Public Exhibit of New Locomotives

BARRE, VT.

TO THE EDITOR:

I have just read the letter that Mr. Ainsworth wrote to you, appearing in your issue of July 11 about the Burlington placing one of its locomotives on exhibition for the engineering students of the University of Colorado.

I wish to say that the Central Vermont placed engine number 600, one of its new Mountain type locomotives, on exhibition at Burlington, Vt., for the benefit of the engineering students at the University of Vermont in the class of 1928. When it received its first Texas type engine (No. 700) in 1928 it was placed on exhibition for a few hours at different places on the main line and at Montpelier, Vt., for the public to inspect.

ELWIN K. HEATH.

Offer Lowest Fares One Day a Week

NEW YORK.

TO THE EDITOR:

It has been announced that certain western and southwestern railroads have decided to abandon the two-cents-a-mile rate which they have been "trying out" for some time past. I am not surprised. The rail-bus problem is not going to be solved by any such methods as that. Guesswork! That is all they are. The sooner the railroads awaken to that fact, the better for all concerned.

The weak link in the chain of passenger department administration is this: *Nobody knows what it costs to transport a passenger.* Until we do know, it is a waste of breath to talk about the "right" rate. For all I know, there is no such thing. But there is a rate which is not so high as to discourage travel nor so low as to be wholly unprofitable to the carriers. Let the railroads find out what that rate is—by a series of long-continued experiments carried on in various parts of the country.

The automobile is here to stay. So is the motor bus. The motor bus is a thorn in the side of the railroads. To reduce passenger rates, day in and day out, to one and a half or two cents a mile, merely to put the buses out of business is suicidal. But if, as I suspect, the chief attraction the buses offer is low rates, the railroads could meet and *beat* this competition by making equally low rates—both one way and round trip—one day a week. By doing this, they could "clean up" the cheap travel. They would, in all likelihood, get so large a proportion of it that the long-distance buses would have to quit.

J. M. CAMPBELL.

New Book

Coal. By A. T. Shurick, consulting mining engineer, 1775 Broadway, New York. Price $12.

This book is made up of loose-leaf graphs which provide a means for recording statistical data, such as weekly production movement, prices, consumption and stocks, etc., of the coal industry. Space is provided on active graphs for projecting one or more years ahead, and blank sheets with appropriate rulings may be inserted for supplementary graphs on the same models for local districts, states, company performances, prices, etc., to suit individual needs. Explanatory text preceding the graphs gives source of data and scheduled time of publication.

Odds and Ends . . .

Something New in Commuters

For 17 years, Henry Manasse, 72 years of age, has ridden the Reading between his home at Reading, Pa., and Philadelphia, 59 miles, to attend every major league baseball game that has been played in the latter city—a rather unique record among commuters. Before 1914, Mr. Manasse was an occasional commuter to Philadelphia but when in that year he retired from the clothing business in Reading, he was left free to indulge to the fullest his baseball commuting whim. Between May 1 and October 1, he boards the 11:20-o'clock train every morning at Reading, except on double-header days when he finds it necessary to take the 9:10.

Where the Pinch Will Be Felt Most

Among the many letters received by the Interstate Commerce Commission protesting against an increase in freight rates is one from the J. L. Summers Manufacturing Company, Newark, N. J., whose officers can see in the railroad proposal nothing but another scheme to pinch the consumer. The letter says that as recently as April 20, its principal product, shoe horns, iron or steel, was advanced from third to second class in the Official Classification and that the increase in rates "came at a very inopportune time and has already hurt the sale of this particular article." A further increase of 15 per cent, this company believes, would be disastrous.

When the Pullman Building Was an Apartment Hotel

The Pullman building on Michigan boulevard at Chicago, that monument to the days when George M. Pullman was the guiding genius of the Pullman Palace Car Company, was entirely too spacious for office purposes when it was opened in 1884, and all but three of the nine floors were turned into an apartment hotel. The elevators near the Michigan boulevard entrance, the Pullman News relates, were for the exclusive use of the apartment tenants, while those near the Adams street entrance were for office employees. A score of notables who were making their start in Chicago in the Eighties and Nineties lived there. One relic of the Pullman Company's venture as a landlord still remains in the building storeroom. It is a painting of Mme. Emma Eames, grand opera star, left there by the admiring artist when his rent became overdue and he was forced to vacate his apartment. Another resident had a shelf 12-in. in width around the walls of each room, and on the shelves were nothing but quart bottles of Scotch and Irish whisky.

The Ghost Train's Successor

NEW YORK.

TO THE EDITOR:

Arlington Bryant in the *Railway Age* of June 27 shows, by Citing the instance of Lake Shore & Michigan Southern locomotive No. 4712, that New Haven locomotive No. 129 was not the only locomotive ever operated in the United States with two headlights. To further controvert that statement I have a distinct recollection of another instance about 1896 or 1897.

When the famous "Ghost Train" of the New England (formerly the New York & New England), leaving Boston at 3 o'clock in the afternoon, was discontinued, the leaving time of its successor was advanced to 1 o'clock. The train was moved from the old New England station at the foot of Summer street, where the South station now stands, to the Park Square station and operated to Readville, Mass., over the Providence division of the New Haven, thence running over the tracks of the original New England road. This train was the predecessor of thte present Knickerbocker Limited of the New Haven. The locomotive hauling this train was a Rogers 4-4-0 type and bore the New England number 185, or possibly 183 or 184. It carried two headlights, side by side in front of the stack and was thus equipped for many months.

DR. FREDERICK S. MCKAY.

NEWS

I. C. C. to Investigate Various Railway Practices

That the Interstate Commerce Commission is not planning to devote the next few months exclusively to a consideration of the railroad rate case was indicated on July 13 when it announced that it had instituted a proceeding of inquiry and investigation into "certain practices of carriers which affect operating revenues and expenses" with a view to ascertaining whether they are "lawful and consistent with economical and efficient management" and to furnish the commission with "information necessary to perform its duties." The subjects announced as first to be investigated are: Prices paid for railroad fuel, and practices in connection with the handling of coal at tidewater points; lake coal; private freight cars; the spotting of cars at industries; and the construction and maintenance of sidings for shippers. They will be set down for hearing, as separate parts of the investigation, at times and places subsequently to be announced.

The proceeding has been designated as Ex Parte 104, while the rate case is Ex Parte 103, and administrative charge of it has been assigned to Division 6, Commissioners Eastman, McManamy and Lee. It is understood that much of the work will be done by the Bureau of Service which has already collected some information along the lines indicated.

Truck-Competitive Rates

The New York, New Haven & Hartford has been authorized by the Interstate Commerce Commission to put into effect on short notice a freight tariff establishing a rate of 35 cents per 100 lb. minimum 60,000 lb., on all commodities named in the official classification, with a few exceptions, between Boston and Harlem River, or New York Pier No. 37, East River, to meet the competition of trucks that have offered rates as low as 40 cents including pick-up and delivery service. The proposed rate supersedes rates ranging from 40 to 66 cents. The immediate reason for the application was that the Eastern Steamship Lines had established a similar rate in a Shipping Board tariff which did not require the statutory notice of 30 days.

The northwestern railroads have applied to the commission for authority to establish a 20-cent station-to-station freight rate between Seattle, Wash., and Portland, Ore., for an experimental period ending with 1931, to meet truck competition, applicable on all commodities with a few exceptions not particularly susceptible to truck transportation. The minimum on the 20-cent rate is to be 40,000 lb. and it takes the place of 25-cent and 30-cent rates subject to a minimum of 30,000 pounds.

Interborough Loses Seven-Cent Fare Suit

The Court of Appeals, highest court in the State of New York, on July 15, decided in favor of the City of New York in the litigation to prevent any action looking to the advance of the universal five cent fare to a rate of seven cents on the lines operated by the Interborough Rapid Transit Company. The court confines itself to the single question whether the state Transit Commission has power under the law to increase the rate of fare without the consent of the city. The court holds that the rate is fixed by the contract between the operating company and the city. "It was clearly the intention of the legislature that the Public Service Commission, predecessor of the present Transit Commission, should not make a rate of fare except on approval of the city."

It is believed that the Interborough will abandon its efforts to carry the fare question to the Federal courts.

The court also sustained the lower court in denying the Interborough the right to charge a ten-cent fare on the lines of the Manhattan Elevated.

New England Council in Favor of B. & M.-New Haven Merger

The New England Council has formally notified the governors of the six New England States that the Council has placed itself on record as in favor of consolidation of the Boston & Maine and New York, New Haven & Hartford, provided control of the consolidated roads rests in New England. A resolution to this effect was passed at the Council's twenty-third quarterly meeting, recently held. The governors were notified that all the Rhode Island members present, and in addition two Massachusetts members, had voted against the resolution for consolidation, while all other members present from all other states, had voted in favor.

The Council's vote virtually endorses the majority report of the New England Governor's Railroad Committee which the six New England governors appointed nearly two years ago at the suggestion of the Council. The resolution follows:

"Resolved, that the New England Council declare itself in favor of the consolidation of the Boston & Maine and New Haven railroads, provided this be worked out in such manner that the control shall rest in New England."

S. P. Employees Organize to Promote Patronage

Employees on the Southern Pacific Lines have organized and instituted a vigorous campaign against unrestricted and unregulated highway transportation service in an effort to win traffic back to the railroads. Numerous "Railroad Family Clubs" have been organized and at the railroad's headquarters at San Francisco, Cal., the "Southern Pacific Club", composed of more than 3,000 members of the general office forces, has entered into an active campaign.

At San Francisco and at points on the line employees have held meetings with addresses by speakers sympathetic to the railroads, to which merchants and business men were invited in order to enable them to gain first-hand information of the employee attitude. The message of "Ship by Rail" has been brought to the fore in these meetings. In return for expenditures by employees in local stores they expect the merchant to patronize railroad freight service. These meetings have been supplemented by local newspaper advertisements which have included a list of firms that ship by rail.

In buying from local merchants employees hand out cards reading: "This purchase made by a railroad employee with Railroad Payroll Money. Ship and Travel by Rail and help keep ME on the Payroll so I can continue to trade with YOU." The card carries the Southern Pacific Lines emblem in one corner.

Wheat Crop Moves Rapidly

Loadings of the 1931 wheat crop in the Southwest have reached high levels during June and July, both because of a heavy yield per acre and a desire on the part of growers to market their wheat at present prices. Loadings of grain, mostly wheat, on the Atchison, Topeka & Santa Fe from June 15 to July 13 totaled 37,342 cars as compared with 32,073 in the same period in 1930. The Santa Fe set a new high mark for a single day on July 8 with 2,723 cars loaded. Other days of large wheat loadings were June 30, 2,568 cars; July 1, 2,436; July 7, 2,424; July 9, 2,576. The previous record was on July 13, 1929, when 2,149 cars were loaded in a single day. During the five days from July 7 to 11 inclusive, the Santa Fe loaded 12,292 cars, or an average of 2,458 cars per day, which is the longest sustained heavy loading of grain that the railroad has experienced. The Santa Fe had about 20,000 cars in reserve at the start of the grain movement, and has borrowed 5,000 additional cars from connections.

On the Chicago, Rock Island & Pacific

from June 15 to July 11, the grain loading totaled 14,667 cars, as compared with 12,030 cars in the same period of 1930. The largest single day's loading was on July 11, with 1,149 cars. On both the Santa Fe and the Rock Island, the peak of the grain movement has now been passed.

Excursion Tariff Suspended

The Interstate Commerce Commission has suspended from July 10, until February 10, 1932, the operation of schedules published by the Chicago Great Western proposing the acceptance of excursion passenger tickets in parlor or sleeping cars upon payment of parlor or sleeping car fare between Chicago, Forest Park and Maywood, Ill., on the one hand and St. Paul and Minneapolis on the other hand.

Wage Statistics for April

Class I railways have reported to the Interstate Commerce Commission a total of 1,331,138 employees as of the middle of the month of April, and their total compensation was $187,319,049. Compared with the returns for the corresponding month of last year the summary for April shows a decrease in the number of employees of 241,428 or 15.35 per cent. The total compensation shows a decrease of $38,441,186, or 17.03 per cent.

I. C. C. to Investigate Truck Service of Electric Line

On petition of the Chicago & North Western the Interstate Commerce Commission has ordered an investigation of the rates and practices of the Chicago, North Shore & Milwaukee incident to its operation of a "ferry truck" service between Chicago and Milwaukee by which it loads and transports on flat cars merchandise loaded in truck bodies and trailers. The investigation was ordered under the docket number of the commission's recent investigation of container service.

Illinois Governor Signs Motor Vehicle Limitations Law

A bill limiting the size of motor buses and trucks operated on the highways of Illinois has been signed by Governor Emmerson of that state. It provides that a bus or truck must not exceed 35 ft. in length, nor any combination of vehicles, such as a truck and trailer, 65 ft. in length. After January 1, 1933, combinations of vehicles must not exceed 40 ft. in length. After the same date, all trucks must be equipped with pneumatic tires if they are operated at a speed of more than 10 miles an hour.

North Western Prizes for Young Farmers

The Chicago & North Western has created 50 new prize trips to Chicago for the International Livestock Exposition each December for Four-H club boys and girls. This action increases the number of trips now available for boys and girls who are proficient in the raising of livestock and in home economics to 150 each year. The prizes are restricted to contestants residing along the lines of the North Western and are in each case equal to the cost of one round trip ticket to Chicago from the station at which the winner lives.

Farmers Shown N. Y. Terminals

Sixty farmers and agricultural agents from Delaware, Maryland and Virginia were the guests of the Pennsylvania in New York on Tuesday and Wednesday, July 14 and 15, having been escorted to the city on Monday evening by officers of the road and of the Federal Farm Board. The visitors inspected the fruit and vegetable terminus of the Pennsylvania at Pier 27, North River, where 725 carloads of perishables can be displayed at one time, and afterward visited the Sunnyside express terminal, the Pennsylvania's dining car commissary, and other facilities.

Erie Pleads Guilty

The Interstate Commerce Commission has announced that the Erie on July 10 had pleaded guilty in the federal court at Newark, N. J., to 15 counts in an indictment charging it with failure to collect published tariff charges on carload shipments of flour stored in its Weehawken pier for Frederick W. Huber, Inc., a flour dealer of Brooklyn, N. Y., and that Federal Judge Bascom S. Deaver had imposed a fine of $1,000 on each count, or $15,000. The indictment was returned by a federal grand jury on information furnished by the commission's Bureau of Inquiry. Ten counts of the indictment were dismissed.

Retiring Roadmaster Honored

In commemoration of the long and loyal service of James Teyro, roadmaster on the Minneapolis & St. Louis, at Hopkins, Minn., who retired on May 31, after 51 years of continuous service, this road has published an attractively printed and illustrated booklet containing a biographical record of Mr. Teyro's career. The booklet is entitled "After 51 Years" and is the story of "The Old Roadmaster," As stated in the foreword, the booklet contains "the simple recital of one plain honest man's life which has been entirely devoted to one job..... For 51 years he has capably and faithfully served the Minneapolis & St. Louis, whose management has issued this little tribute as a mark of the esteem in which they hold him."

Court Sanctions L. & N. Shop Closing

The federal district court at Louisville, Ky., on July 6, issued a temporary injunction restraining the city of Cloverport (Ky.) from attempting to compel the Louisville & Nashville to fulfill a contract which provides for the maintenance of shop facilities at that point. The court held that the city is entitled to a jury trial to determine the amount of damages, not in excess of $20,000, to which it may be entitled. The contract with the city was originally made by the Louisville, St. Louis & Texas, and provided that the road's shops should be located at Cloverport in return for the proceeds from the sale of $20,000 city bonds. When the L. & N. purchased the Louisville, Henderson & St. Louis, the successor of the L. St. L. & T., the shops at Cloverport were abandoned.

Pullman Excursions Increase Passengers Per Car

Reduced rates offered by the Pullman Company for sleeping car travel on weekends from April 11 to July 12 have resulted in nearly trebling the number of passengers carried per car as compared with the average for 1930. During the 1931 period, 10,029 passengers traveled at Pullman excursion rates in 349 cars, or an average of 28.8 per car. The average number of passengers per car in 1930 was 10.57. One 16-section car operated between St. Paul, Minn., and International Falls on July 3 and 4 carried 42 passengers. Twenty-one cars operated on the same date carried an average of 29.2 passengers per car.

Single occupancy sales have been maintained at a satisfactory rate. During June, 1931, the sales totaled 62,460 as compared with 36,829 in June, 1930, or an increase of about 85 per cent.

Move To Enjoin Enforcement of Texas Motor Truck Law

A petition for an injunction to restrain Texas authorities from enforcing the new law limiting the loads of cotton which may be moved by truck, has been filed in the Federal district court at Houston, Tex., by a firm of cotton factors and shippers. The law, passed in the recent session of the Texas legislature, limits the load of a motor truck to 10 uncompressed bales of cotton or 20 compressed bales, and provides also that the load must be carried in a closed body.

The petition alleges that the shipper has 1931 licenses to operate eight trucks and trailers between points in Colorado County, Tex., and Houston, carrying loads of more than 10,000 lb. The shipper alleges that contracts have been made to deliver more than 5,000 bales of cotton to Houston, contracts which the shipper will be unable to carry out if the new law is enforced.

Chicago Proposes Two New Passenger Terminals

The Chicago city council committee on railway terminals has adopted a plan for the consolidation of the passenger terminal facilities of the railroads now using the Central, Dearborn, Grand Central and La Salle stations in Chicago into two terminals to be known as the New South Central station and the New Lake Front station. The plan would involve abandonment of the four present stations. On July 13 the plan had not yet been presented to any of the railroads involved. It represented the work of the engineer of the city council railway terminals committee, Edward J. Noonan.

Under the proposed rearrangement the

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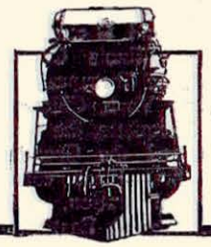

DEPRESSION
has forced
Locomotive Obsolescence

- AS LONG as the traffic was there to move, the railroads were not under pressure to weed out the older power.
- But depression has had a selective effect and the necessity of returning the maximum net out of a diminishing gross has forced the intensive use of the most efficient motive power.
- With the return of normal business, the necessity of maintaining the maximum net will prohibit the introduction of the older and less efficient locomotives into a schedule of operation adjusted to the use of highly efficient motive power.
- Do not let the old locomotives waste the increasing gross. Buy new Super-Power and keep efficiency up to its present standard.

LIMA LOCOMOTIVE WORKS
Incorporated

LIMA — LIMA LOCOMOTIVE WORKS INCORPORATED — OHIO

South Central station, to be located on Harrison street, between La Salle and Wells streets, would serve the New York Central, the Chicago, Rock Island & Pacific, the Baltimore & Ohio, the Minneapolis, St. Paul & Sault Ste. Marie, the Chicago & Alton, the Chicago, Indianapolis & Louisville and the Atchison, Topeka & Santa Fe. Of those roads the Atchison, Topeka & Santa Fe, and the Chicago, Indianapolis & Louisville are now located in the Dearborn station, the Baltimore & Ohio, and the Soo Line are located in the Grand Central station, and the New York Central and the Rock Island occupy the La Salle station. The Chicago & Alton would be removed from the Union station in favor of the Wabash which now uses the Dearborn station.

The Lake Front station, to be located on the site of the present Central station at Roosevelt road and Michigan avenue, would serve the Illinois Central, the Michigan Central, the Chesapeake & Ohio, the Erie, the New York, Chicago & St. Louis, the Pere Marquette, the Chicago & Eastern Illinois and the Grand Trunk Western. The first three roads now occupy the Central station, while the Erie, and the Chicago & Eastern Illinois

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 171 Steam Railways, Including 17 Switching and Terminal Companies.

FOR THE MONTH OF MAY, 1931 AND 1930

Item	United States		Eastern District		Southern District		Western District	
	1931	1930	1931	1930	1931	1930	1931	1930
Average number of miles operated	242,880.83	242,636.18	60,242.58	60,343.55	46,100.93	46,121.76	136,537.32	136,170.87
Revenues:								
Freight	$283,161,230	$354,429,276	$120,912,374	$158,307,908	$55,276,160	$64,607,339	$106,972,696	$131,514,029
Passenger	46,981,178	60,428,360	26,778,810	33,577,729	5,589,329	7,515,795	14,613,039	19,334,836
Mail	8,828,943	9,325,212	3,401,480	3,637,918	1,496,032	1,564,742	3,931,431	4,122,552
Express	9,360,426	12,221,721	3,888,711	5,410,479	1,766,902	2,079,249	3,704,813	4,731,993
All other transportation	12,461,590	15,701,552	7,226,293	9,431,220	915,628	1,073,388	4,320,669	5,196,944
Incidental	7,482,272	10,378,579	4,016,037	5,448,814	1,031,751	1,344,286	2,434,484	3,585,479
Joint facility—Cr.	976,757	1,214,831	328,396	451,984	199,042	219,747	449,319	543,100
Joint facility—Dr.	233,295	435,950	80,061	199,564	24,636	30,209	128,598	206,177
Railway operating revenues	369,020,101	463,263,581	166,472,040	216,066,488	66,250,208	78,374,337	136,297,853	168,822,756
Expenses:								
Maintenance of way and structures	52,627,360	70,784,644	21,114,074	28,763,458	9,313,560	11,416,943	22,199,726	30,604,243
Maintenance of equipment	72,372,224	90,505,034	33,909,335	42,146,434	13,101,964	16,296,653	25,360,925	32,061,947
Traffic	10,270,622	11,305,287	3,985,281	4,249,070	1,775,490	2,029,437	4,509,851	5,026,780
Transportation	134,487,689	159,619,645	63,241,664	75,688,601	22,365,775	25,811,660	48,880,250	58,119,384
Miscellaneous operations	3,472,573	4,426,195	1,703,692	2,140,016	375,872	476,058	1,393,009	1,810,121
General	15,484,374	16,496,696	6,689,511	7,096,152	2,752,330	2,758,891	6,042,533	6,641,653
Transportation for investment—Cr.	647,519	1,195,221	127,397	216,792	102,285	94,252	417,837	884,177
Railway operating expenses	288,067,323	351,942,280	130,516,160	159,866,939	49,582,706	58,695,390	107,968,457	133,379,951
Net revenue from railway operations	80,952,778	111,321,301	35,955,880	56,199,549	16,667,502	19,678,947	28,329,396	35,442,805
Railway tax accruals	27,965,474	31,014,383	11,785,146	13,604,309	5,374,127	5,643,338	10,806,201	11,766,736
Uncollectible ry. revenues	61,678	84,454	29,865	27,921	8,855	18,055	22,958	38,478
Railway operating income	52,925,626	80,222,464	24,140,869	42,567,319	11,284,520	14,017,554	17,500,237	23,637,591
Equipment rents—Dr. balance	8,986,375	8,314,106	4,067,637	4,181,685	1,037,530	393,668	3,881,208	3,738,753
Joint facility rent—Dr. balance	2,675,631	2,585,772	1,487,845	1,395,494	288,386	271,254	899,402	919,024
Net railway operating income	41,263,620	69,322,586	18,585,389	36,990,140	9,958,604	13,352,632	12,719,627	18,979,814
Ratio of expenses to revenues (per cent)	78.06	75.97	78.40	73.99	74.84	74.89	79.22	79.01

FOR FIVE MONTHS ENDED WITH MAY, 1931 AND 1930

Average number of miles operated	242,779.69	242,746.88	60,267.29	60,359.97	46,097.51	46,139.09	136,414.89	136,247.82
Revenues:								
Freight	$1,392,969,074	$1,711,299,790	$602,461,780	$750,198,406	$271,029,668	$327,901,192	$519,477,626	$633,200,192
Passenger	241,206,688	313,619,616	136,019,675	168,857,917	33,482,197	47,067,127	71,704,816	97,694,572
Mail	44,028,882	46,406,525	16,879,317	17,692,018	7,476,536	7,845,622	19,673,029	20,868,885
Express	38,276,185	50,544,092	15,530,602	22,714,780	7,171,693	8,290,583	15,573,890	19,538,729
All other transportation	60,112,984	74,528,377	34,704,816	43,006,880	4,780,788	6,033,238	20,627,380	25,488,259
Incidental	37,594,457	47,060,947	20,259,815	24,605,951	5,716,875	7,157,042	11,617,767	15,297,954
Joint facility—Cr.	4,733,708	5,526,874	1,551,845	1,835,929	843,456	983,672	2,338,413	2,707,273
Joint facility—Dr.	1,294,944	1,681,732	381,238	516,014	130,134	164,242	783,572	1,001,476
Railway operating revenues	1,817,627,034	2,247,304,489	827,026,612	1,028,395,867	330,371,073	405,114,234	660,229,349	813,794,388
Expenses:								
Maintenance of way and structures	236,081,744	308,881,433	99,100,061	126,389,394	45,838,064	58,097,655	91,143,619	124,394,384
Maintenance of equipment	372,156,533	460,775,884	173,237,251	214,003,653	67,039,384	83,530,594	131,879,898	163,241,637
Traffic	50,336,320	55,289,286	19,271,578	21,199,931	9,445,130	10,296,102	21,619,612	23,793,253
Transportation	684,124,119	814,174,213	323,738,225	384,875,406	113,997,894	133,204,942	246,388,000	296,093,865
Miscellaneous operations	18,261,221	22,813,286	8,909,671	10,871,432	2,386,140	3,123,946	6,965,410	8,817,908
General	78,487,926	82,451,485	34,207,679	36,052,124	13,692,124	13,847,722	30,588,123	32,551,639
Transportation for investment—Cr.	2,819,040	5,158,666	514,920	979,007	279,717	493,093	2,024,403	3,686,566
Railway operating expenses	1,436,628,823	1,739,226,921	657,949,545	792,412,933	252,119,019	301,607,868	526,560,259	645,206,120
Net revenue from railway operations	380,998,211	508,077,568	169,077,067	235,982,934	78,252,054	103,506,366	133,669,090	168,588,268
Railway tax accruals	137,246,365	149,194,860	54,868,454	60,715,507	27,251,306	29,704,874	55,126,605	58,774,479
Uncollectible ry. revenues	348,395	446,476	167,555	188,831	52,735	72,549	128,105	185,096
Railway operating income	243,403,451	358,436,232	114,041,058	175,078,596	50,948,013	73,728,943	78,414,380	109,628,693
Equipment rents—Dr. balance	42,330,277	39,391,442	20,854,022	20,117,793	3,917,990	1,619,774	17,558,265	17,653,875
Joint facility rent—Dr. balance	12,685,585	10,828,163	7,018,992	5,398,063	1,270,037	1,069,859	4,396,556	4,360,241
Net railway operating income	188,387,589	308,216,627	86,168,044	149,562,740	45,759,986	71,039,310	56,459,559	87,614,577
Ratio of expenses to revenues (per cent)	79.04	77.39	79.56	77.05	76.31	74.45	79.75	79.28

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

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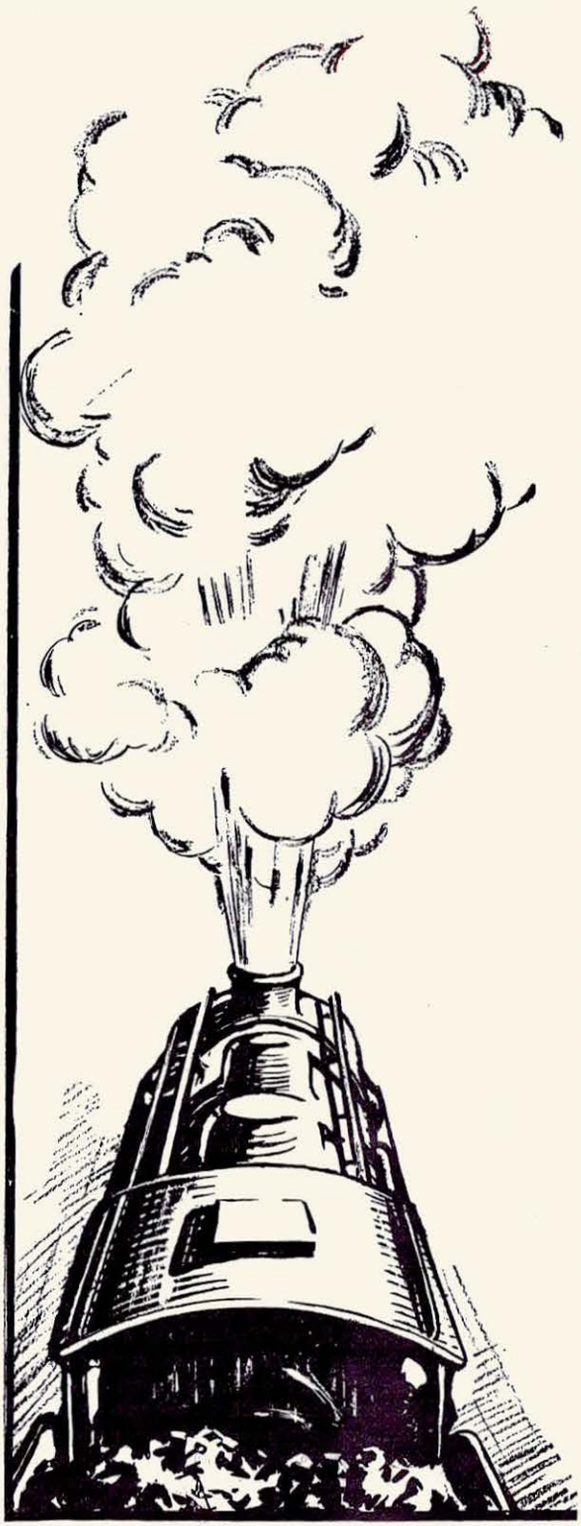
MORE EFFICIENT CYLINDERS

for the

MODERN SWITCHER



BY continued improvement, boiler efficiency has been stepped up to 70 or 80%. But cylinder efficiency is still way down at 10 to 12%. Cylinder efficiency can be substantially increased by building the Limited Cut-Off into your new locomotives.

Without effort on the part of the engineman and without maintenance, the Limited Cut-Off compels the expansive use of steam at all times.

Steam is really used economically so that up to 30% of the fuel is saved.

The Limited Cut-Off is now essential to an efficient locomotive; road engine or switcher. It is in use on hundreds of modern locomotives. If The Locomotive Booster is also applied, a six wheel switcher will do the work of an eight.

FRANKLIN RAILWAY SUPPLY COMPANY
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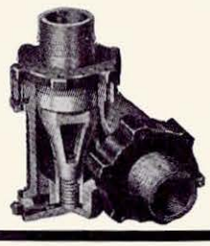
NEW YORK CHICAGO SAN FRANCISCO ST. LOUIS MONTREAL

THE FRANKLIN SLEEVE JOINT...

An improved flexible joint that gives long service with little attention.



occupy the Dearborn station; the New York, Chicago & St. Louis occupies the La Salle station and the Pere Marquette and the Grand Trunk Western occupy the Grand Central station. No mention is made in the plan of the Chicago Great Western, which now uses the Grand Central station.

The total cost of the terminal consolidation under this plan is estimated at between $20,000,000 and $25,000,000. The occasion for the preparation of the plan is the proposed opening of several city streets southward from the "Loop" through an area that is now covered with railway yards.

Construction of Montreal Terminal Proceeding Rapidly

Construction of the Canadian National's $50,000,000 terminal at Montreal, Que., is proceeding rapidly, and erection of steel girders over street openings for the viaduct, which will provide entrance to the terminal, has begun.

One of the most important features of the terminal plan, the viaduct, is a unique structure in railroad construction. It is the foundation for the electrified direct elevated approach to the central passenger terminal from the Victoria bridge, and includes as well a number of reinforced concrete buildings for use as warehouses, garages, and light manufacturing plants. These buildings, forming the base of the viaduct structure, will be two stories high. The viaduct will shorten the distance from the Victoria bridge over the St. Lawrence river to the station by more than two miles, or less than half the distance by the present route through St. Henri.

Fire Protection Association

The Railway Fire Protection Association's news letter No. 43, which has been issued by W. F. Hickey, president (New Haven, Conn.) contains a notice that the regular meeting for 1931 has been indefinitely postponed, to which is added a request to chairmen of committees to continue their work and complete their reports with a view to possible future use, perhaps in September. The principal article in the pamphlet is a discussion of pipe lines for natural gas and gasoline, the construction of new lines of this kind being an active subject of discussion at a number of places.

A number of leading members of the Association held an informal conference at Toronto, in May, on the occasion of the meeting of the National Fire Protection Association. Eight pages of the pamphlet are given to a report of a meeting of the Eastern Section of the Railway Fire Protection Association, which was held in New York City on June 15.

Massachusetts Savings Banks Plan for N. E. Roads

A committee representing mutual savings banks in Massachusetts on July 16 adopted a plan for the allocation of New England railroads among the various trunk lines. In connection with its recommendations, the committee presented a discussion of consolidations as they affect New England territory.

The report as adopted by the Executive Committee included the following recommendations:

1. We believe—contrary to the general tenor of the report of the New England Governors' Railroad Committee—that the interests of New England would be best served by a complete extension through its territory of the proposed four-party trunk lines system of the North Atlantic States. This extension in substance would encourage the control by the Pennsylvania of the New York, New Haven & Hartford.
2. The Baltimore & Ohio should enjoy access by rail to the port of Boston.
3. The Chesapeake & Ohio-Nickel Plate should enjoy entry into New England over Boston & Maine lines.
4. The New York Central and the Canadian railways should continue to enjoy their present privileges.

N.I.T. League to Participate in Rate Increase Proceeding

The executive committee of the National Industrial Traffic League, meeting on Wednesday, July 15, adopted a resolution providing for active participation by the league in the rate increase proceeding and in the investigation of railroad practices for the purpose of assisting in the development of pertinent facts to determine the financial needs of the carriers and capital requirements for further improvement in railroad transportation facilities and to determine whether or not any additional economies in transportation may be effected. The committee had previously decided not to take any action.

Rock Island to Convert Locomotives for Oil Burning

The Chicago, Rock Island & Pacific plans the immediate conversion of 231 additional locomotives used on its lines south and west of Kansas City, Mo., from coal burning to oil burning. The conversion will involve the construction of 13 roadside stations for fuel oil on the lines between Kansas City and Belleville, Kan., and between Herington, Kan., and El Reno, Okla., including a number of branch lines in Oklahoma.

Oil stations will be located at Topeka, Kan., Cline, Caldwell, Clay Center, McFarland, Armourdale, and Herington; Haileyville, Okla., Hobart, Lawton, Enid, Ardmore, and Anadarko. The work of converting the engines will be done in the Rock Island shops and the working time there will be increased beginning July 13. It is expected that it will require from 60 to 90 days to complete the conversion.

When completed, this conversion will effect decided economies in operation on the basis of present fuel oil prices. Locomotives on the Arkansas-Louisiana and the Oklahoma divisions of the Rock Island were changed from coal to oil burning in 1930 and on the El Paso-Amarillo and Pan-Handle Indian Territory divisions in 1928.

Foreign

Rail-Highway Express Service in Great Britain

The initial step in a comprehensive plan for the conveyance of parcels by co-ordinated rail and highway express services, covering the whole of its system and designed to meet the needs of the big London and provincial mail order firms, was recently taken by the Great Western of Great Britain. Parcels up to 100 lb. may now be sent through from London or any Great Western station, to any of 39 towns and villages in outlying districts within 20 miles of Oxford and served by the City of Oxford Motor Services Ltd.

At each of the towns agents have been appointed and the new service enables parcel traffic to be conveyed by express services throughout—by rail to Oxford or Didcot and from these stations by the services operated by the highway company. Outlying places are thereby brought into immediate touch with London and other parts of the country.

H. H. Sterling Heads New Zealand Railways

Herbert H. Sterling has been appointed chairman of the new board of directors for the New Zealand Government Railways, created under an act passed at the latest session of the New Zealand parliament and designed to bring about non-political control of the railways. Mr. Sterling, who first entered the service of the New Zealand railways in 1901, was general manager at the time of his appointment to the chairmanship. He served in various positions on the railways between 1901 and 1923, when he was appointed assistant general manager. In 1925 he was elected a member of the board then constituted to take over the management of the railway department. From 1926 to 1928, Mr. Sterling was engaged in other lines of business in New Zealand and in May, 1928, when the New Zealand railway board of management was abolished, he returned to railway service to become general manager.

No Changes in British Railway Rates Following Review

No changes in British railway rates were embodied in the recent report of the Railway Rates Tribunal of Great Britain following its third annual review of railway revenues under the provision of the Railway Act, 1921. This act established standard net revenues for each of the four principle railways in Great Britain and imposed upon the Railway Rates Tribunal the duty of making such adjustments as would produce the standard revenues. The gross deficiency from standard revenues during 1930 was £13,124,000 but, because of the economic situation, the railways did not propose any increase in rates at the present time. Doubt was expressed as to whether a general increase would result in any material revenue gains.

The Tribunal found that the revenue

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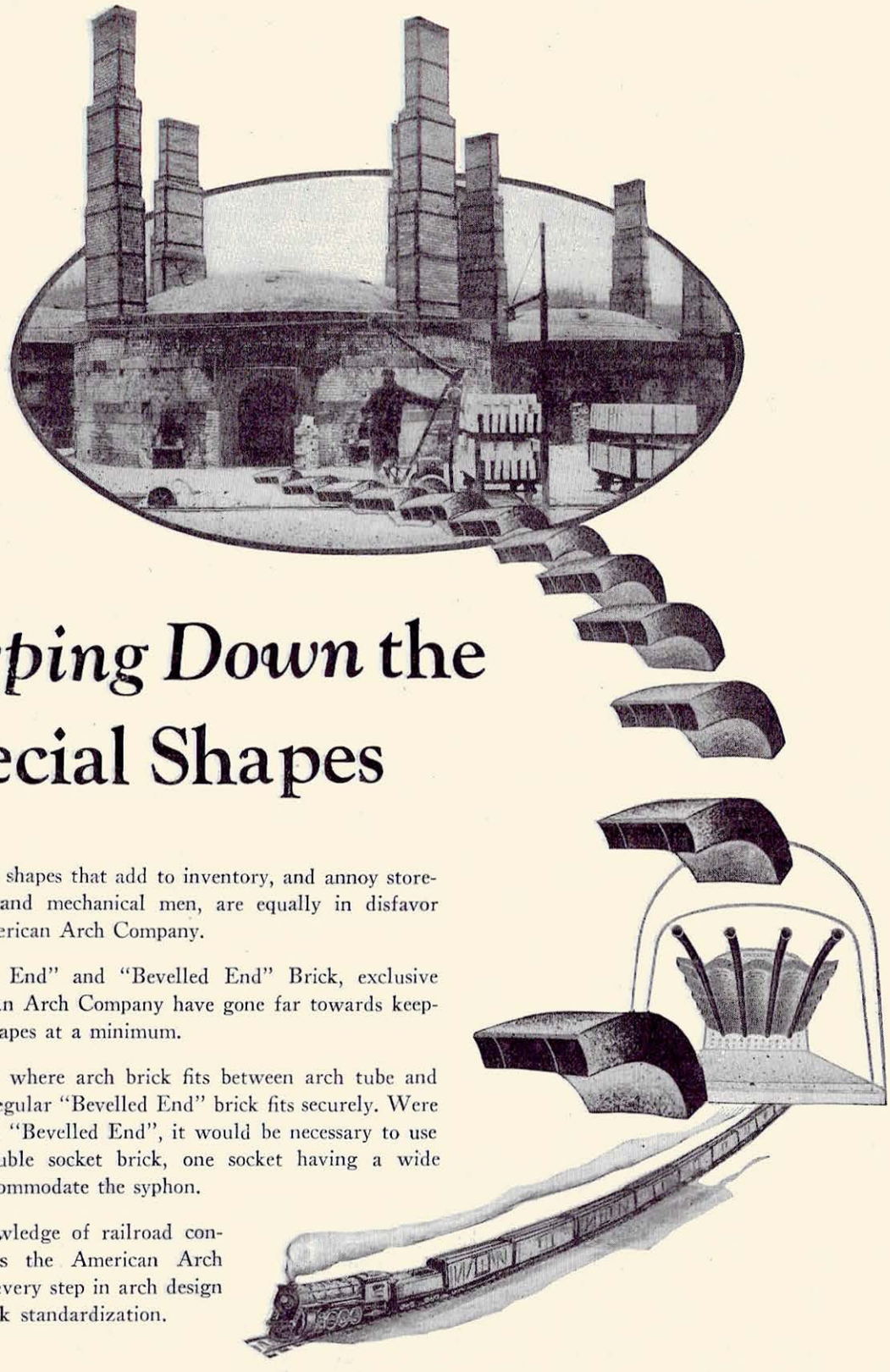


Keeping Down the Special Shapes

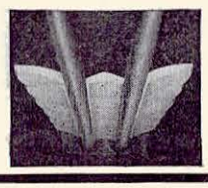
SPECIAL shapes that add to inventory, and annoy storekeepers and mechanical men, are equally in disfavor with the American Arch Company.

"Sled-runner End" and "Bevelled End" Brick, exclusive with American Arch Company have gone far towards keeping special shapes at a minimum.

For example, where arch brick fits between arch tube and syphon, the regular "Bevelled End" brick fits securely. Were it not for the "Bevelled End", it would be necessary to use a special double socket brick, one socket having a wide radius to accommodate the syphon.

Intimate knowledge of railroad conditions guides the American Arch Company in every step in arch design and arch brick standardization.

HARBISON-WALKER REFRACTORIES CO.
Refractory Specialists



AMERICAN ARCH CO.
INCORPORATED
Locomotive Combustion Specialists » » »

deficiencies were not due to any lack of efficiency or economy in management but were assignable mainly to the continued depression in business. The decision also discussed the investments of the railways in highway transport concerns and found that thus far these investments had been remunerative, yielding a return in the neighborhood of 6 per cent and furthermore that they had been made with the legitimate aim of controling competition by co-ordination. At the same time the Board suggested that "it behooves the companies to walk warily in extending those investments, as no doubt they will; up to the present they seem to have made a genuine effort to prevent the diversion of traffic to road transport from injuring them and to have acted with reasonable prudence."

Finally, the Tribunal allowed claims made by the railways for increases in their standard revenues to compensate for additional capital expenditures made during 1930.

Great Western of Great Britain Extends Truck Service

The Great Western of Great Britain in connection with a program for the expansion of its highway freight service is now receiving delivery of 219 new motor trucks and tractors to cost approximately £127,000. The new vehicles will be used in connection with: The expansion of Great Western collection and delivery services; the inauguration of new rural truck routes; the extension of trucking services to certain low-class commodities; the performance of special rail-highway contracts and of highway services, especially in London and South Wales, for the conveyance of building materials; the concentration of collection and delivery traffic at larger stations serving a wider surrounding area and the development of container service.

The Great Western now operates 1,331 motor vehicles, 2,380 horses and 3,780 horse-drawn vehicles in connection with its collection and delivery services. These services are available at 619 of its stations and during 1930 its highway vehicles covered 8,641,362 miles.

Japan Building Orient's Largest Station at Osaka

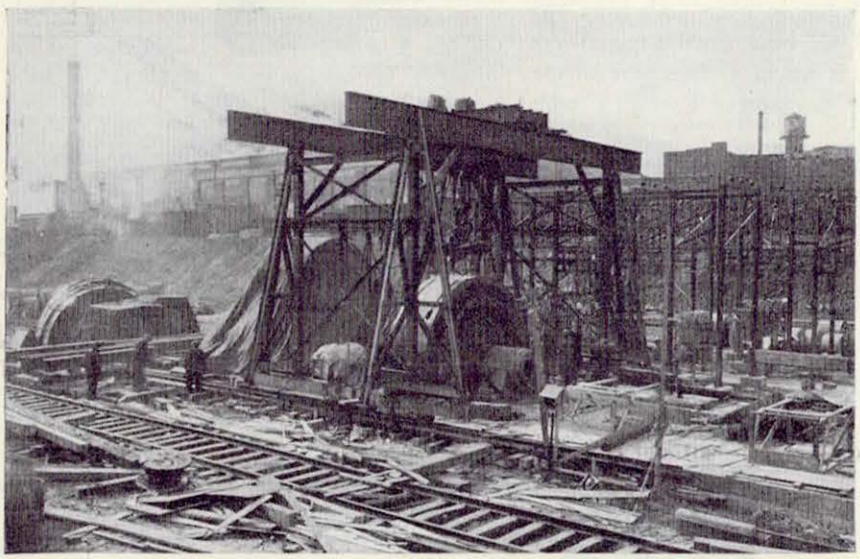
What is to be the largest railroad station in the Far East is now under construction at Osaka, Japan, at an estimated cost of approximately $49,000,000, according to Consul E. R. Dickover, Kobe.

The first stage of the project was begun in 1930, and by the close of the year the concrete work of three of the five overhead lines had been completed at a cost of $563,000. These overhead lines will be connected by a large concourse, 130 by 300 ft., work on which will start in 1931. The elevation of these lines is expected to be completed by the end of 1933, when the elevated system will be put into operation. The main building of the station will be completed by the end of 1935. Japanese designs, materials and labor are being used throughout.

German Railways Enter Trucking Agreement

The German railways have recently entered a contract with Schenker & Co., of Berlin, granting a monopoly to the latter for handling of all highway movements of freight in connection with rail shipments. Under the agreement the truck operator becomes the soliciting agent for the railroad in an endeavor to win back freight which has been moving by highway. At the same time all terminal cartage of freight is handled by the contract hauler with the stipulation that local trucking facilities be utilized under its supervision wherever such a course is feasible. Wherever local trucking agencies are unavailable, however, Schenker & Co. agrees to undertake the terminal handling of railway freight.

* * * *



Installation of Outdoor Type 15,000-kw. Frequency Changer Sets for the Electrification Program Now Being Carried Out by the Reading in the Vicinity of Philadelphia, Pa.

Equipment and Supplies

LOCOMOTIVES

THE CHICAGO, BURLINGTON & QUINCY has ordered one gasoline-electric switching locomotive from the Whitcomb Locomotive Company, subsidiary of the Baldwin Locomotive Works. Inquiry for this locomotive was reported in the *Railway Age* of April 25.

FREIGHT CARS

THE NORTHERN PACIFIC is inquiring for 500 steel underframes and 500 sets of superstructure material for 40-ton single-sheathed box cars.

PASSENGER CARS

THE FONDA, JOHNSTOWN & GLOVERSVILLE is inquiring for six interurban cars.

IRON & STEEL

THE CHICAGO & NORTH WESTERN has ordered 125 tons of steel for a bridge at Dixon, Ill., from the American Bridge Company.

THE READING has placed orders for 2,500 tons of structural steel, for use in and near Philadelphia, Pa., in connection with grade separation and station construction projects, details of which were reported in the *Railway Age* of July 11, page 73. Of the total, 1,900 tons will be used in the superstructure of bridges required in connection with the elevation of tracks and elimination of grade crossings on the Germantown & Chestnut Hill branch between Wister and Musgrave streets, for which the McClintic-Marshall Corporation, Bethlehem, Pa., is the general contractor; 400 tons in trestle and track elevation work appurtenant to the same general project, between Wister and Haines streets, for which a contract has been awarded to the James McGraw Company, Philadelphia, and about 200 tons in the construction of a new station at Jenkintown, Pa., for which the general contractors are William Steele & Sons Company, Philadelphia.

MOTOR TRANSPORT

THE GREYHOUND MANAGEMENT COMPANY, Cleveland, Ohio, has received delivery on 10 Mack Model BK 33-passenger interstate type motor coaches.

IRON AND STEEL STATISTICS.—The American Iron and Steel Institute, New York, has issued its Annual Statistical Report for 1930 covering the production of iron and steel, in a book of 120 pages. The statistics embrace all the principal subdivisions, such as plates, shapes, bars, rails, sheets, etc., and also cover imports and exports and also prices, by months, for a considerable number of products.

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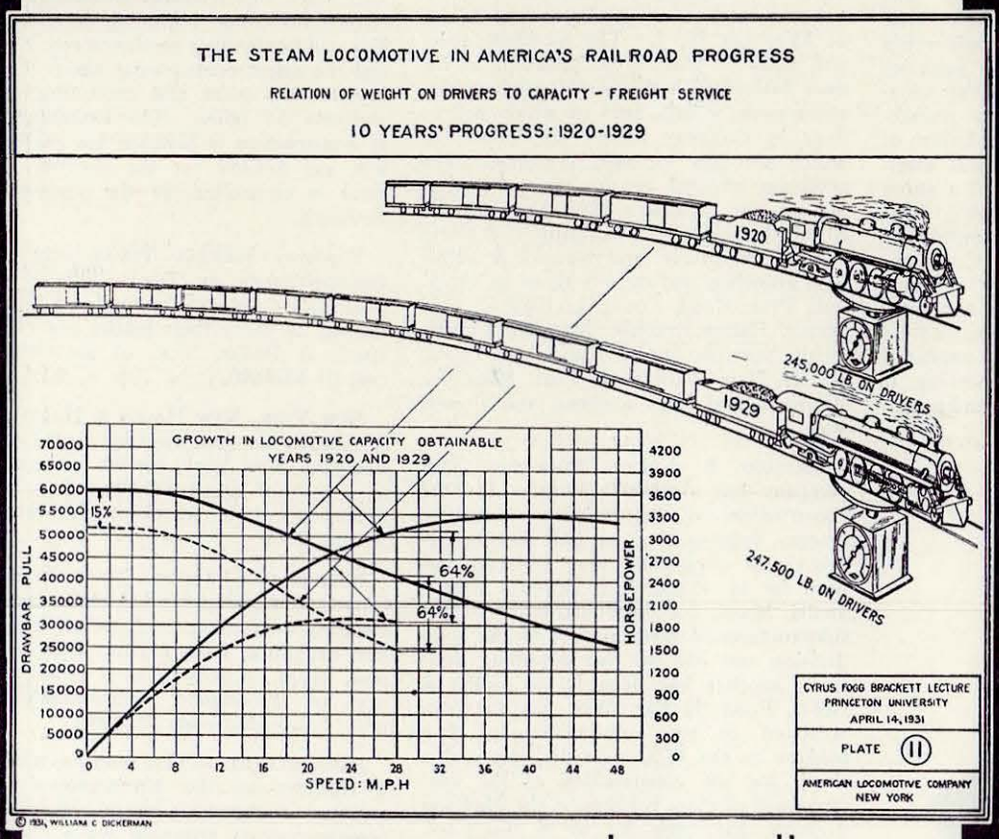
Lower Operating Costs by MODERNIZING



64% More Drawbar Pull At Fast Freight Speeds

THE modern locomotive is so much more powerful and efficient than locomotives built ten years ago that there should be no question regarding the economy of replacing older equipment by modern motive power.

Take this specific case for example. The above graph represents the actual performance of a 1920 and a 1929 locomotive on the same railroad and in the same heavy duty freight service. The 1920 locomotive, with weight on drivers of 245,000 lb., developed at starting a drawbar pull of 52,000 lb. At 28 miles per hour (*see dotted curves*) which is a good average operating speed for freight service today, the engine developed a drawbar pull of 25,000 lb. The locomotive of 1929, with only one per cent more weight on drivers, develops a drawbar pull at starting of 60,000 lb. At 28 miles per hour, however, (*see solid curves*) the 1929 locomotive develops a drawbar pull of 41,000 lb. or 64% more, at that speed, than the 1920 locomotive. And that's what counts.

This big increase in drawbar pull is the true measure of the superiority of the 1929 locomotive over that of 1920.

What is the practical application of all this? Freight schedules in heavy service, making far faster time and without reducing tonnage!

It pays to modernize. The profits now lost will pay the cost.

American Locomotive Company
30 Church Street New York N.Y.

Supply Trade

Announcement is made by the **Westinghouse Air Brake Company** that **Professor S. W. Dudley,** Strathcona Professor of Mechanical Engineering and chairman of the Department of Mechanical Engineering in Yale University, has rejoined its engineering organization in an advisory capacity with the title of Assistant to the Vice-President, while retaining his university connections. After completion of his college course in mechanical engineering at Yale University and a short period of service on the faculty, Professor Dudley entered the employ of the Westinghouse Air Brake Company as special apprentice in 1905 and advanced steadily until he was appointed chief engineer in 1914, which position he retained until 1921 when he accepted the chair of mechanical engineering in his Alma Mater. Many outstanding air

S. W. Dudley

brake developments mark the period during which he was associated with this company, and in these achievements he had a prominent part. Because of his broad experience, pleasing personality, and keen insight into human affairs as well as engineering practices, Professor Dudley has been in demand for various activities and positions of responsibility with the college. He is a member of the board of trustees and governing board of Sheffield Scientific School, chairman of the University Committee on Transportation, member of the Industrial Committee of the Institute of Human Relations in Yale, and member of the Committee on Relations between Railroads and Colleges of the Society for the Promotion of Engineering Education. He is a member of the Publication Committee of the American Society of Mechanical Engineers, was formerly chairman of its Meetings and Program Committee, and also headed the committee in charge of its Fiftieth Anniversary celebration in 1930.

Construction

CENTRAL OF NEW JERSEY.—The New Jersey Board of Public Utility Commissioners has issued a modification of earlier orders, dated May 7, 1929, and January 28, 1931, concerning the elimination by this company of a number of grade crossings in Elizabeth, N. J. The modified order will make it possible to proceed, in the near future, with the actual grade separation work, a large part of which will be done by company forces, and plans for which are now virtually complete. The crossings affected by the general project are on the railroad's main line through Elizabeth and on its Elizabethport & Perth Amboy, Broadway, and Newark & Elizabeth branches, and include those at Trumbull, Pine, Bond, Court, Livingston, East Jersey, Fulton, Franklin, Marshall, Fourth, Fifth, Seventh, Division and East Grand streets, New Point road, Port, Magnolia, Elizabeth and First avenues, and Broadway.

CHICAGO & NORTH WESTERN.—This company has awarded contracts for the construction of substructures for nine bridges, representing its 1931 bridge improvement program. One contract has been let to Peppard & Burrill, Minneapolis, Minn., for the construction of the substructures of three bridges on the Iowa division and one on the Wyoming division; another has been let to Gaffin & Gehri, Fond du Lac, Wis., for the construction of the substructure of two bridges on the Wisconsin division, and a third, for the construction of the substructures of three bridges on the Madison division, has been let to S. G. Cool, Chicago. Erection of the steel superstructures for these bridges will be undertaken by company forces.

CHICAGO, BURLINGTON & QUINCY.—A contract has been awarded to G. A. Johnson & Son, Chicago, for the construction of a yard office at Galesburg, Ill. A contract for the construction of an interlocking tower at the same point has been let to the Ellington-Miller Company, Chicago. A contract for the installation of a pneumatic tube system at Galesburg yard has been awarded to the Lamson Company, Syracuse, N. Y.

CINCINNATI UNION TERMINAL.—A contract has been awarded to the Ferro Concrete Construction Company, Cincinnati, Ohio, for the construction of a two-story brick, steel and concrete express building, 70 ft. by 740 ft., at Cincinnati, at an estimated cost of $430,000.

DELAWARE & HUDSON.—Specifications and estimates of cost for the elimination of a grade crossing of this company's tracks and the Elsmere-Bethlehem county highway at Elsmere station, Bethlehem, N. Y., have been approved by the New York Public Service Commission.

DELAWARE & HUDSON.—The Public Service Commission of New York has designated for elimination the grade crossing of this company's line and the Cambridge-Salem state highway, two miles south of Salem station, Salem, N. Y. The elimination is to be accomplished by raising the grade of the highway on its present alignment and carrying it over the railway tracks.

FORT WORTH & DENVER NORTHERN.—The Interstate Commerce Commission has authorized this company to construct two branch lines, one beginning near Lefors, Tex., and extending southwesterly 7 miles, and the other commencing about 9 miles beyond this point and extending southwesterly 3.4 miles. The estimated cost of construction is $192,536 for the longer line and $73,459 for the shorter. This road is controlled by the Colorado & Southern.

MISSOURI - KANSAS - TEXAS — ST. LOUIS SOUTHWESTERN OF TEXAS.—These roads contemplate the construction of a highway subway to carry their tracks over Lamar street at Dallas, Tex., at an estimated cost of $325,000.

NEW YORK, NEW HAVEN & HARTFORD.—A contract has been awarded to the Austin Company, New York, for the construction, at a cost of about $85,000, of a 147-ft. extension to a warehouse at Harlem River, N. Y.

NORTHERN PACIFIC.—The Interstate Commerce Commission has authorized this company to construct and operate a branch line extending from a point near Woodrow, Mont., northerly to a point northeast of Bloomfield, approximately 24 miles; estimated cost, $720,000.

PENNSYLVANIA.—This road has awarded a contract to the Underground Construction Company, Chicago, Ill., for the construction of retaining walls and subways to cost approximately $354,500, on the Englewood Connecting Railway between South Halsted street and South Hoyne avenue, Chicago. Another contract, awarded to the James McGraw Company, Philadelphia, Pa., involves an estimated expenditure of $171,600 for the removal of tracks on Seventh street, between Sixth street and Atlantic avenue, Camden, N. J.

PENNSYLVANIA.—Five contracts involving a total expenditure of approximately $2,500,000 have recently been awarded by this road in connection with its New York-Washington electrification program. The projects, the names of the contractors, and the estimated cost of each are as follows: Catenary foundations between Baltimore, Md., and Washington, D. C., $742,000, awarded to the Arundel Corporation, Baltimore, Md.; catenary foundations between Perryville, Md., and Baltimore, $529,000, awarded to the John F. Casey Co., Pittsburgh, Pa.; multiple duct underground conduit system between Loudon Park, Baltimore, Md., and New York avenue, Washington, D. C., $434,500, also awarded to the Arundel Corporation; multiple duct underground conduit system between Havre-de-Grace, Md., and Back River bridge, near Back River station, on the Maryland division, $383,000, awarded to the James McGraw Co., Philadelphia, Pa.;

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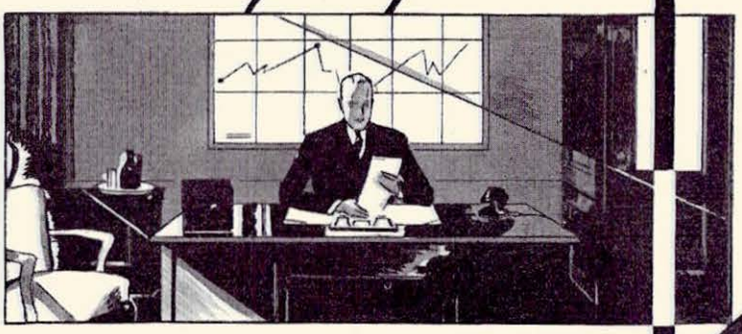
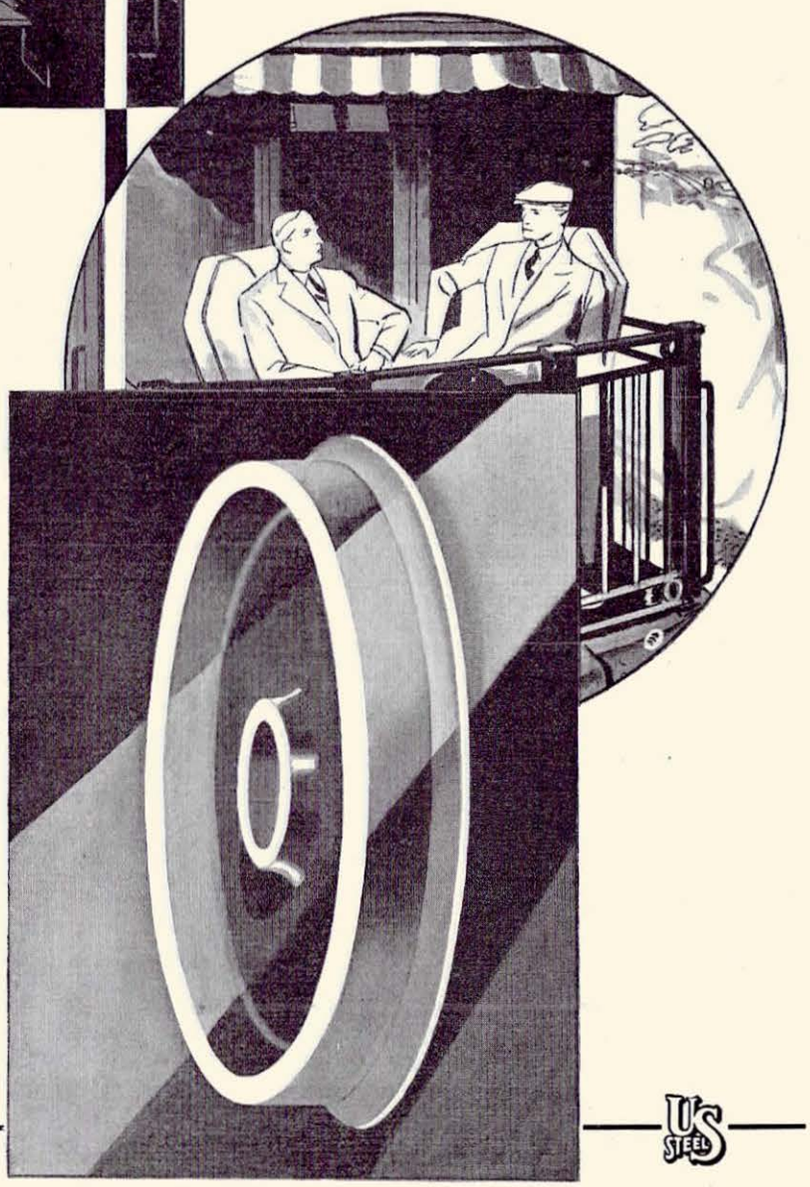
To Those who *must* have QUALITY





THE decisions of railway officials in the matter of purchases of materials are directly reflected in passenger safety and comfort. Realizing this, officials of many prominent railroad systems settle their wheel question by specifying Carnegie Wrought Steel Wheels. Their faith is firmly substantiated by the safe and efficient service these wheels have always rendered.

To anticipate the constantly increasing demands of modern high-speed transportation, Carnegie Rim-Toughened Wrought Steel Wheels are now available for all classes of service. The special process of heat treatment adds materially to the service ordinarily expected of wrought steel wheels. Accurate machining insures perfect rotundity with a consequent increase in riding comfort. Carnegie Rim-Toughened Wheels are quality wheels for those who must have equipment preeminently reliable. Carnegie wheel engineers are at your service at all times.

U·S STEEL

CARNEGIE WROUGHT STEEL WHEELS

Product of Carnegie Steel Company, Pittsburgh, Pa., Subsidiary of United States Steel Corporation

148

multiple duct underground conduit system between West Yard, Wilmington, Del., and Perryville, Md., $404,600, awarded to the Vare Construction Co., Philadelphia, Pa.

PENNSYLVANIA.—Work on this company's extensive improvement program at Baltimore, Md., has been carried one step further with the opening, on July 14, of bids on construction to be started in the near future, according to W. B. Wood, engineer in charge of Baltimore improvements. Contracts soon to be awarded cover a number of highway and railroad bridges separating several street crossings, and representing the first section of the Pennsylvania's grade crossing elimination program to be placed in actual process of construction.

Plans are also being rushed on the proposed new Union tunnel, so that the start of preliminary bridge construction will be closely followed by actual work on the tunnel project itself. It is anticipated that excavations for the tunnel and other initial work on the tube project will begin the latter part of next month and that, on a rapid construction schedule, the entire tunnel north of Pennsylvania station will be completed by the end of December, 1932.

In addition to the new highway and bridge structures now to be built, bids have also been received for the raising of the Pennsylvania tracks between Franklin street and Gwynn's Falls, to bring the rails to the higher grades of two of the new bridge structures. Work will be started immediately on this phase of the improvement project.

Bridges on which contracts will be awarded by the City of Baltimore, to be constructed at the joint expense of the railroad company and the city, and on which work will be started in the near future, include those at Loney's lane, north of Pennsylvania station, and Lafayette avenue, Warwick avenue and Garrison lane, south of the terminal. Plans are rapidly nearing completion covering several additional bridges, and bids will be asked within the next week or so on new structures at Gay, Preston, Wolf, Biddle and Washington streets. Railroad officials expect to get under way with this additional bridge work before the end of July. Three grade crossings within the city limits of Baltimore will be entirely eliminated by the building of the bridge structures now to be contracted for at Loney's lane, Lafayette avenue, and Garrison lane. All the new bridges will be of sufficient width to accommodate the additional trackage which the Pennsylvania will build through the city as a part of its improvement work, and will be attractively designed of concrete and steel to harmonize completely with their surroundings. At Loney's lane and Lafayette avenue the highways will pass over the railroad tracks, while the railroad will go over the streets at Biddle, Washington, Preston, Wolf and Gay streets, Broadway, Warwick avenue and Garrison lane.

The new Union tunnel north of Pennsylvania station, work on which will start late next month, will extend from Bond street to Greenmount avenue, carrying two main tracks with full overhead clearance to accommodate the electrical apparatus on cars and locomotives. The tunnel proper will be about 3,400 ft. long, and at its lowest point the tracks will be about 55 ft. below the street. The new tube will parallel the Pennsylvania's present tunnel from the north into Pennsylvania station.

ST. LOUIS-SAN FRANCISCO.—A contract has been awarded to the Hedges-Weeks Construction Company, Springfield, Mo., for the construction at Springfield of a reinforced concrete water storage reservoir, 30 ft. wide, 90 ft. long and 12 ft. deep, and a firehouse having one story and a basement.

Financial

BALTIMORE & OHIO.—*Time for Disposition of Western Maryland Again Extended.*—The Interstate Commerce Commission on July 13 made public an order granting this company an additional extension of time to January 13, 1932, in which to divest itself of its stock in the Western Maryland as required by the commission's order of January 13, 1930, which followed an investigation under the Clayton anti-trust law. The extension was granted, however, only on condition that the stock be placed in the hands of a trustee to be approved by the commission, as was done in the case of the Wheeling & Lake Erie stock acquired by the Nickel Plate.

BURLINGTON-ROCK ISLAND.—*Trackage Rights.*—The Interstate Commerce Commission has authorized this company to operate under trackage rights over the railroad and terminal facilities of the Galveston Terminal Railway in Galveston, Tex., 4.8 miles of line.

CAROLINA.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon its entire line, approximately 13.3 miles, in Lenoir and Greene Counties, N. C., and the operation under trackage rights over 3 miles of the Norfolk & Southern.

CHICAGO & NORTH WESTERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon a branch line extending westerly 14.5 miles from Beaver, Mich.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $467,000 of first and general mortgage 6 per cent bonds, series B, to be pledged and repledged as security for short term notes.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon that part of its line extending from Long Grove to DeWitt, Iowa, 9 miles.

ILLINOIS CENTRAL. — *Abandonment.* — This company and the Chicago, St. Louis & New Orleans have applied to the Interstate Commerce Commission for authority to abandon the branch line from Moffatt, Tenn., to Troy, 4.41 miles, and this company and the Yazoo & Mississippi Valley have applied for authority to abandon the line from Boyle, Miss., to Dockery, 8.23 miles.

KENTUCKY & INDIANA TERMINAL.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $500,000 of first mortgage 4½ per cent bonds to be pledged and repledged as collateral security for short term notes.

MARINETTE, TOMAHAWK & WESTERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon a line of 13.42 miles in Lincoln county, Wis.

MARYLAND & DELAWARE COAST.—*Receiver Asked.*—The Pennsylvania Company for Insurance on Lives and Granting Annuities has filed a bill of complaint in the federal court at Wilmington, Del., asking the appointment of a receiver. The line runs from Denton, Md., to Lewes, Del., 38 miles.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $12,500,000 of first refunding mortgage 5½ per cent bonds, to replace an issue of 6 per cent bonds, and to be held in the treasury until further order.

MISSISSIPPI EASTERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon that portion of its line extending from Crandall, Miss., eastward to Threadville, 1.1 mile.

MOBILE & OHIO.—*Omits Dividend.*—Directors of this company have omitted the usual semi-annual dividend disbursement of $3.50 per share, due at this time, announcing that further consideration would be given the matter in December. In December of last year the company paid a $5 extra dividend over and above its total regular annual disbursement of $7.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—*Dividend Reduced.*—The directors of this company have reduced the semi-annual dividend from the customary $2.50 to $1.50.

NICHOLAS, FAYETTE & GREENBRIER.—*Acquisition.*—This company, organized jointly by the Chesapeake & Ohio and the New York Central to construct a new line serving the New River district in West Virginia has applied to the Interstate Commerce Commission for authority to acquire the properties of the Sewell Valley, the Loop & Lookout and the Greenbrier & Eastern. The New York Central and C. & O. also applied for authority to lease and operate the lines when acquired and the Nicholas, Fayette & Greenbrier asked authority to issue $8,000,000 of additional common stock and to assume $300,000 of first mortgage bonds of the Sewell Valley.

PERE MARQUETTE. — *Acquisition.* — This company has applied to the Interstate Commerce Commission for authority to acquire control of the Manistee & North-

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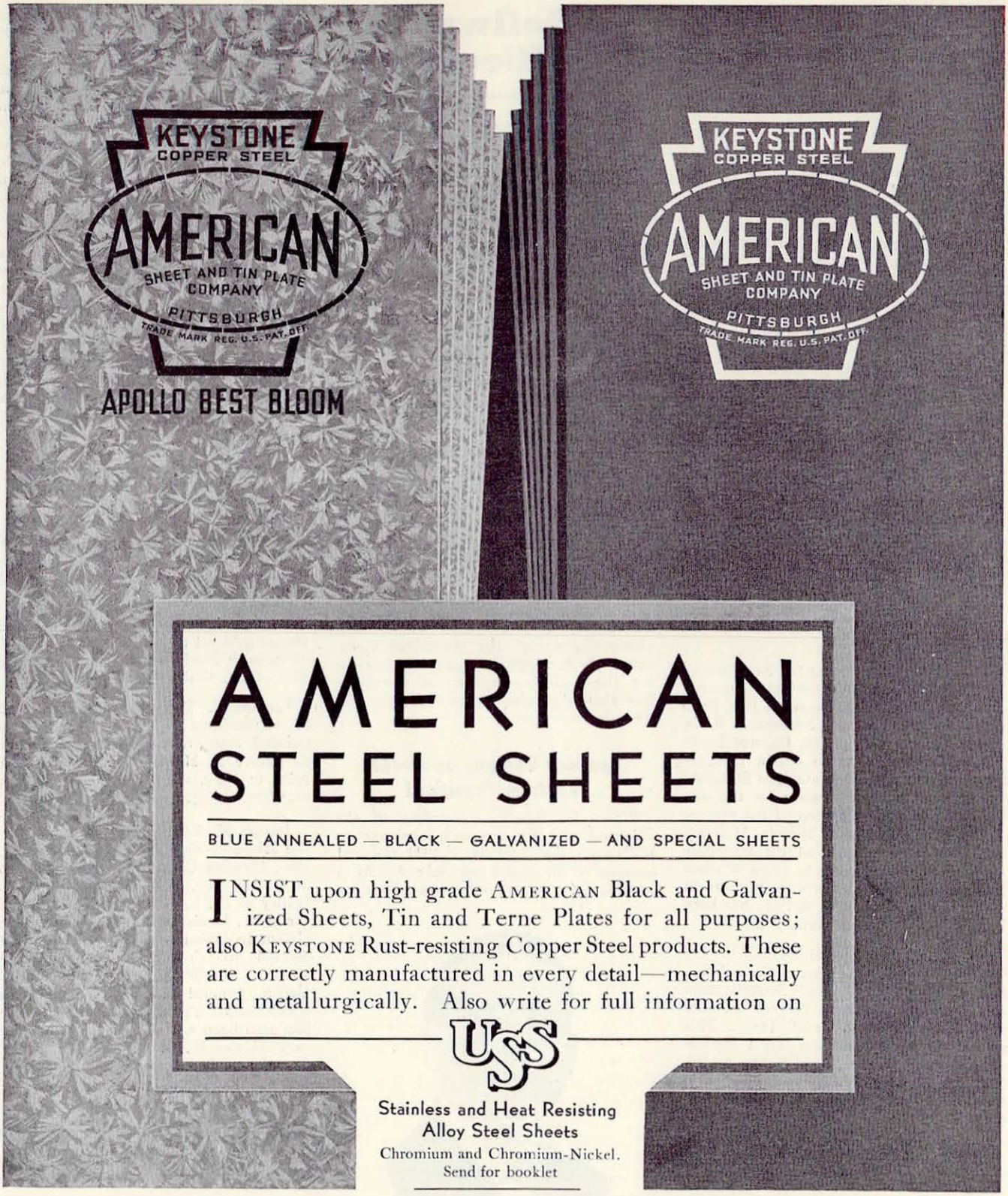

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BLUE ANNEALED — BLACK — GALVANIZED — AND SPECIAL SHEETS

INSIST upon high grade AMERICAN Black and Galvanized Sheets, Tin and Terne Plates for all purposes; also KEYSTONE Rust-resisting Copper Steel products. These are correctly manufactured in every detail—mechanically and metallurgically. Also write for full information on

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Chromium and Chromium-Nickel.
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GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

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ILLINOIS STEEL COMPANY

FEDERAL SHIPB'LDG. & DRY DOCK CO.
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & RAILROAD CO.
UNIVERSAL ATLAS CEMENT COMPANY

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Export Distributors—United States Steel Products Company, 30 Church St., New York, N. Y.

eastern by purchase of stock and by lease. It has a contract to purchase the entire capital stock for $497,297 by September 26, 1932.

RICHMOND, FREDERICKSBURG & POTOMAC.—*Recapture Order Ignored.*—This company has failed to remit to the Interstate Commerce Commission the $696,705 which the commission on April 7 ordered it to pay to the "general railroad contingent fund" within 90 days as representing the balance due of one-half the amount by which the commission found that its net railway operating income for 1922 and 1923 exceeded 6 per cent on the value of its property as determined by the commission. It was also stated at the office of the commission that no application had been received from the company for any extension of the date to allow for litigation and this is taken to mean that the company intended to place on the commission the burden of suing for the money and of justifying its calculations of value and income, instead of itself applying for an injunction against the commission's order in the way that the St. Louis & O'Fallon did. The R. F. & P. case represents the only one since the O'Fallon in which the commission has issued a final recapture order. In it the commission adopted a revised method of figuring value, taking into consideration estimates of both original cost and cost of reproduction, less depreciation.

ST. LOUIS, JERSEYVILLE & STRATTON.—*New Company Formed.*—This company was incorporated in Illinois on July 13 to take over the Chicago, Springfield & St. Louis between Springfield, Ill., and Lockhaven, 80 miles, and to obtain trackage rights from Lockhaven into East St. Louis, 27 miles. The present plans for the new railroad involve the leasing of the property to the Chicago & Illinois Midland, subject to the approval of the Interstate Commerce Commission, to form a route between Peoria, Ill., through Springfield to Lockhaven. The C.S. & St.L. has been in receivership since January 24, 1930.

ST. LOUIS SOUTHWESTERN.—*Control.*—The Interstate Commerce Commission has authorized the St. Louis Southwestern of Texas to acquire control of the Stephenville North & South Texas. This extends for one year from July 1 the life of a lease of the Stephenville line by the St. L. S. W. which has been in force since 1923, having been renewed from time to time.

Average Prices of Stocks and of Bonds

	July 14	Last week	Last year
Average price of 20 representative railway stocks..	69.01	70.02	118.08
Average price of 20 representative railway bonds..	91.58	91.91	94.27

Dividends Declared

Cuba Railroad.—Preferred, 3 per cent, payable August 1 to holders of record July 20.

Hudson & Manhattan.—Preferred, 2½ per cent, semi-annually, payable August 15 to holders of record August 1.

Michigan Central.—$25, semi-annually, payable July 31 to holders of record July 21.

Mobile & Ohio.—Dividend omitted.

Nashville, Chattanooga & St. Louis.—$1.50, semi-annually, payable August 3 to holders of record July 25.

Railway Officers

EXECUTIVE

W. A. Scrivner, traffic manager of the Aransas Harbor Terminal, with head quarters at Aransas Pass, Tex., has been elected vice-president and manager, with the same headquarters.

J. A. James has been elected vice-president in charge of traffic of the Kosciusko & South Eastern and the Mobile & Gulf, with headquarters at Louisville, Ky.

M. O. Bicknell has been appointed assistant to the co-receiver of the Wichita Northwestern, with headquarters at Pratt, Kan. Mr. Bicknell will have supervision over the operating and maintenance departments.

E. L. King, superintendent of the Portland division of the Southern Pacific at Portland, Ore., has also been elected president of the Northern Pacific Terminal Company of Oregon. **J. P. O'Brien,** general manager of the Oregon-Washington Railroad & Navigation Co., at Portland, has also been elected vice-president of the Terminal Company. **A. A. Hampson,** general attorney for the Southern Pacific at Portland, has also been elected secretary of the Terminal Company.

Boatner Resigns as Great Western President

Victor V. Boatner, president of the Chicago Great Western, with headquarters at Chicago, since October 7, 1929, resigned because of ill health on July 9. At a meeting of the executive committee on

Victor V. Boatner

that date Patrick H. Joyce, chairman of the executive committee since April 8, 1930, was in addition elected acting president of the railroad.

Mr. Boatner has had a varied experience in operating and executive matters, gained largely on the Illinois Central and the Peoria & Pekin Union, prior to his service with the Great Western. He is 50 years of age and a native of Bethlehem, Miss. Following an academic education at Mississippi College and Bowling Green Business University, he entered railway service in 1901 as a station helper on the Yazoo & Mississippi Valley at Elizabeth, Miss. For the following 15 years he served variously as stenographer, telegraph operator, train dispatcher, chief train dispatcher and trainmaster on the Y. & M. V. and the Illinois Central. In 1916 he was promoted to superintendent of the New Orleans division of the Illinois Central at Vicksburg, Miss., where he remained until the following year when he was transferred to the Memphis division. Mr. Boatner became president of the Peoria & Pekin Union at Peoria, Ill., in 1921, a position he held for the following eight years, until his election as president of the Great Western in 1929.

FINANCIAL, LEGAL AND ACCOUNTING

Lazare Baker has been appointed secretary of the Ft. Smith, Subiaco & Rock Island, with headquarters at Ft. Smith, Ark.

J. R. Brown has been appointed assistant general counsel of the Ft. Smith, Subiaco & Rock Island, with headquarters at Ft. Smith, Ark.

Ignacio J. Terroba, general auditor of the National of Mexico, has been appointed comptroller, with headquarters as before at Mexico, D. F. Mr. Terroba, in his new position, will continue the duties of general accountant.

Joseph M. Bryson, general counsel of the Missouri-Kansas-Texas at St. Louis, Mo., **Charles C. Huff,** general solicitor at Dallas, Tex., **J. G. Livengood,** comptroller at St. Louis, **C. D. Pantle,** auditor at St. Louis, and **T. H. Simpson,** assistant treasurer at St. Louis, have been elected to similar positions on the Beaver, Meade & Englewood. **M. D. Green,** general attorney for the Missouri-Kansas-Texas at Muskogee, Okla., has also been appointed assistant secretary of the B., M. & E.

OPERATING

F. A. Mullett has been appointed general superintendent of the Mississippi Eastern, with headquarters at Quitman, Miss.

C. S. Clevenstine, traffic manager of the Clinton, Davenport & Muscatine, has been appointed also general superintendent, with headquarters as before at Davenport, Iowa.

Perry J. Lynch, chief clerk to the superintendent of car service of the Oregon-Washington Railroad & Navigation Co., has been promoted to superintendent of car service, with headquarters at Portland, Ore., succeeding **Samuel A. Hering,** deceased.

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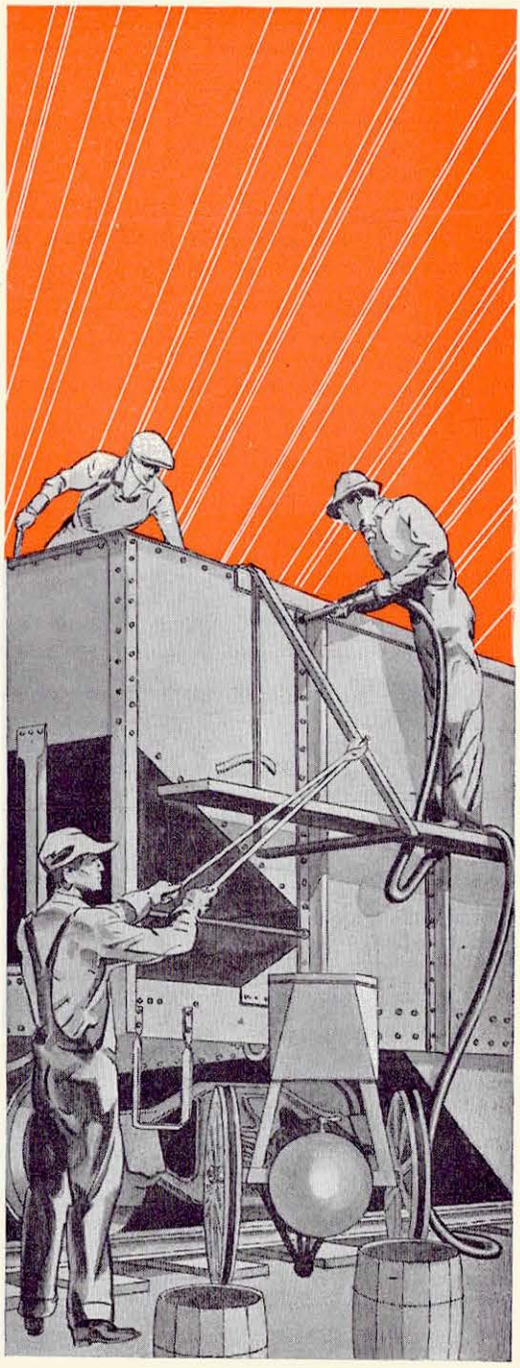
WHY

Let Corrosion Eat Holes in Car Plates UNHINDERED



● The old method of combating corrosion was to give it a heavier weight of plate to feed upon.

The modern method is to take advantage of the progress of metallurgy, and build the cars of a material that possesses a high resistance to corrosion.

Toncan Iron car plates last longer than ordinary car plates due to their special alloy composition of refined iron, copper and molybdenum.

No longer need rust and corrosion take their customary toll.

Many miles of freight cars built of Toncan Iron plates are enjoying lower maintenance due to the superior rust resistance of this modern iron.

Build your new cars of it and cut down on repairs.

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IRON

REPUBLIC STEEL
CORPORATION
GENERAL OFFICES: YOUNGSTOWN, OHIO

D. E. Beatty, superintendent of the Montgomery division of the Louisville & Nashville, with headquarters at Montgomery, Ala., has been transferred to the Pensacola division, with headquarters at Pensacola, Fla., succeeding **W. M. Boykin,** who has been appointed assistant superintendent at the same point.

S. C. Cherry, trainmaster on the Southern, with headquarters at Sheffield, Ala., has been promoted to superintendent of terminals at Memphis, Tenn., succeeding **J. B. Hodgkin,** who has been transferred. **C. D. Vance** has been appointed trainmaster, with headquarters at Sheffield, to succeed **M. J. Bryan,** who replaces Mr. Cherry at the same point.

R. H. Nowell, trainmaster of the Wheeling division of the Pennsylvania, with headquarters at Wheeling, W. Va., has been transferred to the Akron division to succeed **E. C. Gegenheimer,** who has been promoted to superintendent of the Sunbury division. The Wheeling division was recently consolidated with the Cleveland and Panhandle divisions.

T. F. Gardner, superintendent of the Parsons district of the Missouri-Kansas-Texas, with headquarters at Parsons, Kan., has been transferred to the St. Louis district, with headquarters at Boonville, Mo., succeeding **J. F. Hickey,** who has been appointed executive general agent at Kansas City, Mo. **G. C. Byers,** general superintendent with headquarters at Denison, Tex., succeeds Mr. Gardner as superintendent at Parsons.

J. P. Cowley, superintendent of the Galveston division of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., has been appointed superintendent of the newly created Gulf division, which is made up of the former Beaumont and Galveston divisions, with headquarters at the same point. Mr. Cowley, in assuming jurisdiction of the Gulf division, succeeds **J. A. Glen,** who was superintendent of the Beaumont division, and who has been appointed assistant to the general manager at Beaumont, Tex.

TRAFFIC

F. M. Needham has been appointed general freight agent of the Helena Southwestern, with headquarters at Chicago.

A. J. Poston, general agent for the Southern Pacific at Washington, D. C., has retired from active service after nearly 36 years of service with that company.

C. P. Bowsher, general northern agent for the Missouri-Kansas-Texas at Chicago, has been promoted to general freight agent, with headquarters at Kansas City, Mo., to succeed **C. Haile, Jr.,** who has been transferred to St. Louis, Mo. **W. P. Cox,** division freight agent at St. Louis, succeeds Mr. Bowsher as general northern agent at Chicago.

Sidney King, assistant freight traffic manager on the Wabash, has been promoted to freight traffic manager, with headquarters as before at St. Louis, Mo. **D. E. Gilbert,** acting general freight agent at St. Louis, has been appointed senior assistant freight traffic manager in charge of on line agencies, at the same point.

C. B. Walker, who was general freight agent of the Danville & Western, the Carolina & Northwestern, the High Point, Randleman, Asheboro & Southern, the Blue Ridge Railway and the Yadkin Railroad Company, has been appointed general agent of the Southern at Charleston, S. C. **J. L. Cox,** assistant general freight agent of the Southern at Charleston, has been transferred in the same capacity to Athens, Ga.

John H. Colley, assistant to the general passenger traffic manager of the Michigan Central at Chicago, has been promoted to assistant passenger traffic manager of the New York Central Lines at the same point. **A. W. Foellger,** assistant general passenger agent of the Michigan Central at Chicago, has been promoted to chief assistant general passenger agent of that road at Chicago.

E. T. Reynolds, who has been appointed assistant freight traffic manager of the Pere Marquette, with headquarters at Detroit, Mich., was born on April 19, 1878, at Middlemiss, Ont., and was educated at the Collegiate Institute. His first railway service was with the Grand Trunk in 1895 as a relief operator and agent, in which positions he served at

E. T. Reynolds

various points until 1902, when he entered the office of the commercial agent as a clerk. In 1905, Mr. Reynolds went with the Pere Marquette as chief clerk in the general agent's office at Buffalo, N. Y. He was advanced to traveling freight agent in 1906, with headquarters at New York, and from 1908 to 1914 he served as eastbound agent, being appointed commercial agent at Pittsburgh, Pa., on the latter date. In 1918 and 1919 he served in the treasury department of the United States Railroad Administration at Detroit, and at the termination of this service became traffic manager for C. H. Wills & Company, Marysville, Mich. In 1922, Mr. Reynolds returned to the Pere Marquette as general agent in the freight department at Detroit, and in 1924 was advanced to assistant general freight agent. In 1927, he was further advanced to general freight agent, with headquarters at Detroit, which position he was holding at the time of his appointment as assistant freight traffic manager on July 1.

MECHANICAL

Following the consolidation of the Galveston and Beaumont divisions of the Gulf, Colorado & Santa Fe into one division, known as the Gulf division, **C. F. Barnhill,** master mechanic of the Beaumont division, has had his jurisdiction extended to include the Galveston division, with headquarters as before at Silsbee, Tex. **R. E. Bell,** master mechanic of the Galveston division at Galveston, has been assigned to other duties.

ENGINEERING AND SIGNALING

Manuel Salazar Arce, division engineer of the Chihuahua division of the National of Mexico at Chihuahua, Chih., has been transferred to the Pacific division, with headquarters at Acambaro, Gto., succeeding **Augustin Polanco,** who has been transferred to the Jalapa division, with headquarters at Jalapa, Ver. C.

R. H. Crew, division engineer of the Akron division of the Pennsylvania, with headquarters at Akron, Ohio, has been transferred to the office of the chief engineer at Philadelphia, Pa., succeeding **C. J. Code,** who has been transferred to the Renovo division, with headquarters at Erie, Pa., to replace **W. T. Hanley,** deceased.

Following the consolidation of the Beaumont and Galveston divisions of the Gulf, Colorado & Santa Fe into one division, known as the Gulf division, **S. W. Brady,** division engineer of the Beaumont division, has been appointed division engineer of the Gulf division, with headquarters as before at Beaumont, Tex. **Z A. Green,** division engineer of the Galveston division, with headquarters at Galveston, Tex., has been transferred to the Southern division, with headquarters at Temple, Tex., succeeding **J. L. Starkie,** who has been appointed office engineer at Galveston to replace **G. L. Marick,** who has been appointed assistant office engineer, with the same headquarters.

Thomas H. Kearton, who has been promoted to superintendent of signals of the Chicago Great Western, with headquarters at Chicago, has been connected with the signal and telegraph department of that railroad for more than

Continued on Next Left Hand Page

BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

12 years. He was born at Maryport, England, on April 19, 1894, and attended high school at Pittsburgh, Pa. Later he completed his academic education with the extension division of the University of Minnesota and in March, 1910, obtained his first railway experience as a signal repairman on the Panhandle division of the Pennsylvania at Pittsburgh. Two years later he entered the service of the Northern Pacific as a signal maintainer at the St. Paul (Minn.) terminal, where he remained until 1915, when he was promoted to maintenance inspector on the line between Minneapolis, Minn., and Mandan, N. D. In 1918 Mr. Kearton was appointed general signal inspector in charge of construction. He became connected with the Great Western in May, 1919, as a relay repairman, and in the following year was promoted to supervisor of telegraph and signals of the Western division at Mason City, Iowa,

Thomas H. Kearton

where he remained until May, 1925, when he was further promoted to general signal inspector at Chicago. His promotion to superintendent of signals became effective on July 1.

L. C. Hartley, who has retired as chief engineer of the Chicago & Eastern Illinois, with headquarters at Chicago, has occupied various positions in the signal and engineering departments of this road for 31 years. He was born at Masontown, W. Va., on December 29, 1871, and was educated at Ohio State University. His first railway service was in the signal department of the Pittsburgh, Cincinnati, Chicago & St. Louis (now part of the Pennsylvania), in 1898. In 1900 he entered the service of the C. & E. I. as assistant on the engineering corps, being appointed assistant engineer in 1904. Three years later he was promoted to signal engineer and in 1910 was further promoted to engineer maintenance of way. Mr. Hartley became chief engineer in the following year, and held this position continuously until his retirement, which became effective June 15. From 1917 until his retirement, except during the period of Federal control of the railroads, he served also as chief engineer of the Southern Illinois & Missouri Bridge Company, which owns and operates the bridge over the Mississippi river near Thebes, Ill. During Federal control, Mr. Hartley was also chief engineer of the Chicago, Terre Haute & Southeastern (now part of the Chicago, Milwaukee, St. Paul & Pacific, and of

L. C. Hartley

the Evansville & Indianapolis (now part of the Cleveland, Cincinnati, Chicago & St. Louis). In 1928, he was also made chief engineer of the Chicago Heights Terminal Transfer Railroad.

Morris S. Blaiklock, whose retirement as assistant chief engineer of the Canadian National at Montreal, Que., was announced in the *Railway Age* of July 11, entered the service of that road in 1880, when he joined the eng... ...ng staff as draughtsman. In the fall of 1890, he was appointed resident engineer on the work of constructing the St.

Morris S. Blaiklock

Clair tunnel at Sarnia, Ont., continuing there until 1893, when he became inspector of operation at Montreal. In 1897 he was appointed resident engineer of the Eastern district at Montreal, and in 1902 he became superintendent. Mr. Blaiklock was appointed engineer maintenance of way in 1907, and, in 1923, he was appointed assistant chief engineer of the Canadian National, the position he held at the time of his retirement from active service. In connection with his duties on the engineering staff of the C. N. R., Mr. Blaiklock served on a number of important committees and was active in connection with the co-operative management plan with the maintenance of way employees on the system. He will continue to serve as chairman of the General Co-operative Committee of Maintenance of Way employees.

OBITUARY

James F. Murphy, who retired from active service as general manager of the Missouri Pacific, with headquarters at St. Louis, Mo., in 1924, died at Little Rock, Ark., on July 12.

Charles M. Andrews, assistant general freight and passenger agent on the Southern Pacific at Seattle, Wash., died at the Southern Pacific hospital at San Francisco, Cal., on July 10, after an illness of one month. Mr. Andrews was 58 years of age and had been in the service of the Southern Pacific since 1912.

J. P. Driscoll, chief of car accounts of the Canadian National at Montreal, Que., died at his home in that city recently after a 10 days' illness. Mr. Driscoll was in his 67th year and had been in railroad service since 1879. He became general superintendent of car service for the Canadian National in December, 1918, and in 1923 was appointed chief of car accounts, the position he held at the time of his death.

George Christopher Gahan, general auditor of the Canadian Pacific, with headquarters in Montreal, Que., died at his office in that city on July 15 at the age of 56. Mr. Gahan was born in Montreal on December 28, 1874, and entered the service of the Canadian Pacific in 1890 as junior clerk. Until 1916 he served in various clerical positions and as general bookkeeper for the same road, becoming assistant general auditor for the C. P. R. in December, 1916. In March, 1921, he was appointed general auditor, the position he held at the time of his death.

Philip Marsh, treasurer and auditor of the Manufacturers Railway, and treasurer and general auditor of the St. Louis & O'Fallon, with headquarters at St. Louis, Mo., died on July 10, at the Jewish hospital in that city, following an operation for an abdominal ailment. Mr. Marsh, who was 65 years of age, had been in railway service continuously for 50 years, beginning in 1881 as a clerk on the Wabash. In 1883 he went with the Chicago & Alton as clerk and cashier at Kansas City, Mo., and subsequently served as cashier and chief clerk for the Missouri Pacific at Kansas City, and as auditor for the Illinois Terminal at Alton, Ill. In 1911, he assumed the positions he was holding at the time of his death.

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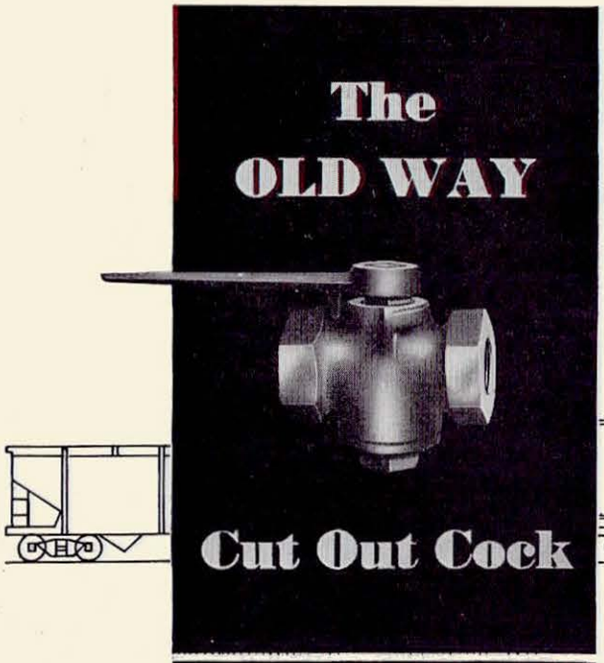

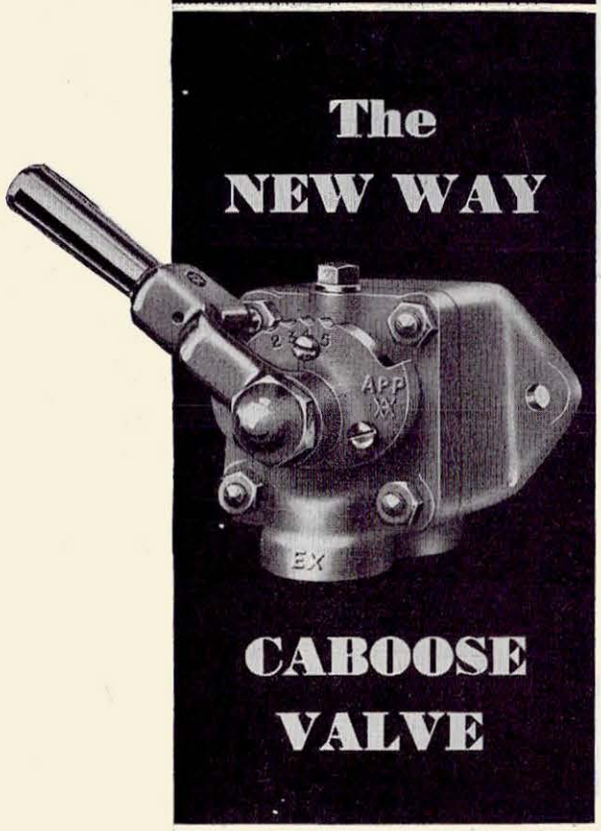

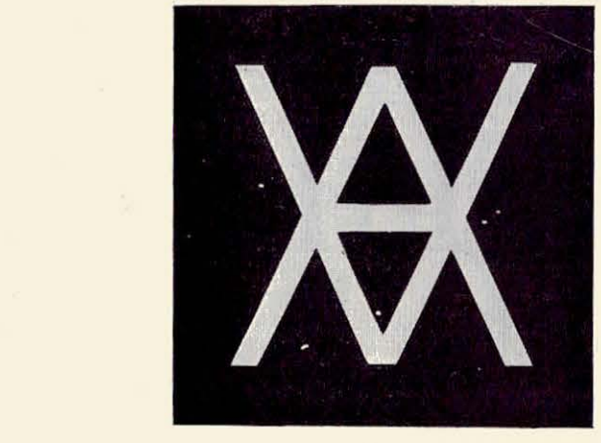

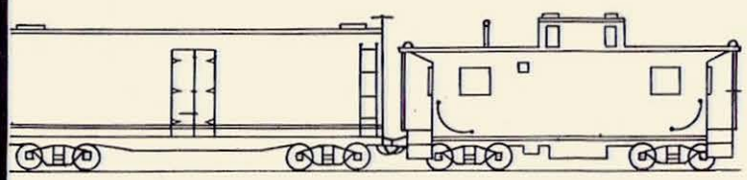

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The device commonly used for this purpose, an ordinary cut-out cock, lacks flexibility. Even the most cautious effort to open it gradually often results in a heavier application of the brakes than intended. Consequently a new device has been developed expressly for the purpose—The CABOOSE VALVE.

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Where conditions *require* that applications be made from the rear of the train, the Caboose Valve will be found a valuable device. It is completely described in Circular Notice 1093. WESTINGHOUSE AIR BRAKE CO., General Office and Works—Wilmerding, Pennsylvania

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every possible pound of drawbar pull of which the engine is capable, must be developed—and sustained.

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On passenger trains this means high sustained speeds. On freight trains it means freer steamers and ability to make the run on schedule time. On small engines it means an extra car or two. On *all* locomotives the Elesco feed water heater provides increased steaming capacity—with no increase in fuel. This means reduced operating expenses.

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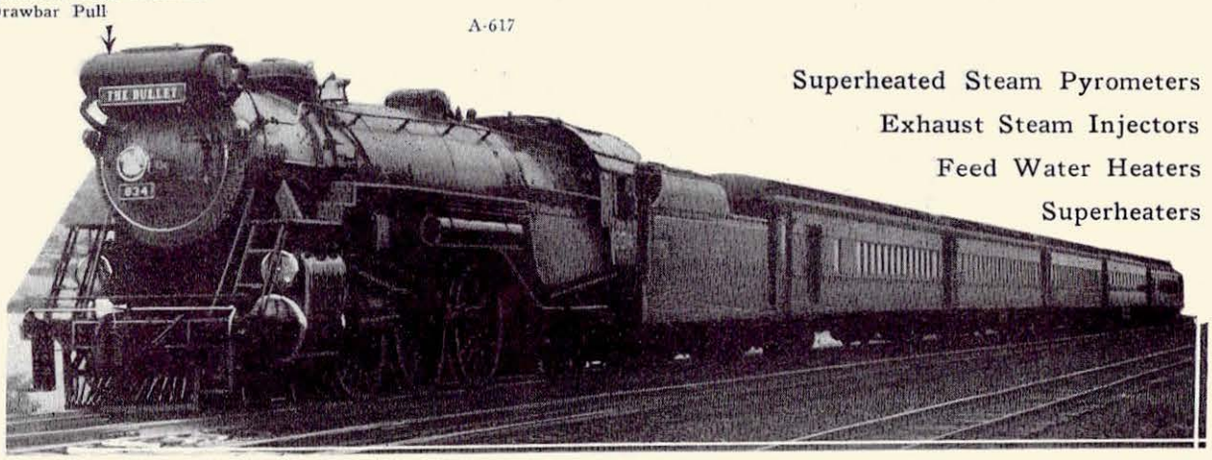

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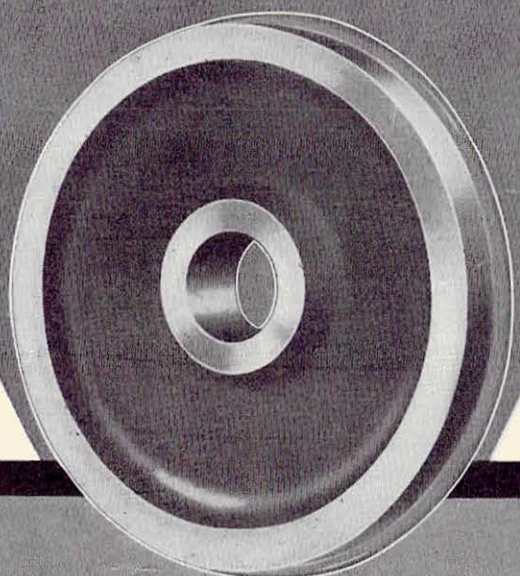

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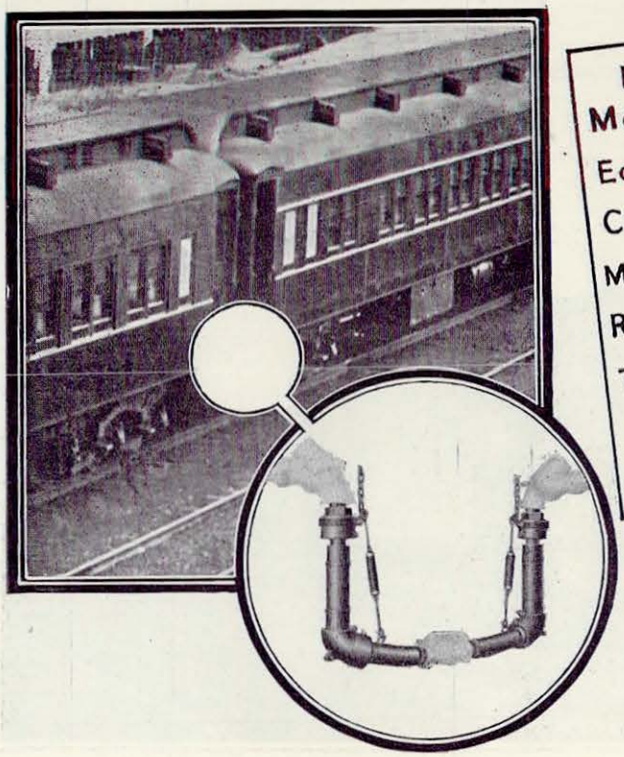

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RAILROADS operating passeng r trains equipped with BARCO Steam Heat connections consume less coal per passenger train mile and spend less money for car maintenance.

BARCO Steam Heat connections reduce fuel consumption because they carry full steam pressure without leaking. The gaskets cannot blow out. They have full capacity in all positions—there are no 90 degree bends to restrict the flow of steam.

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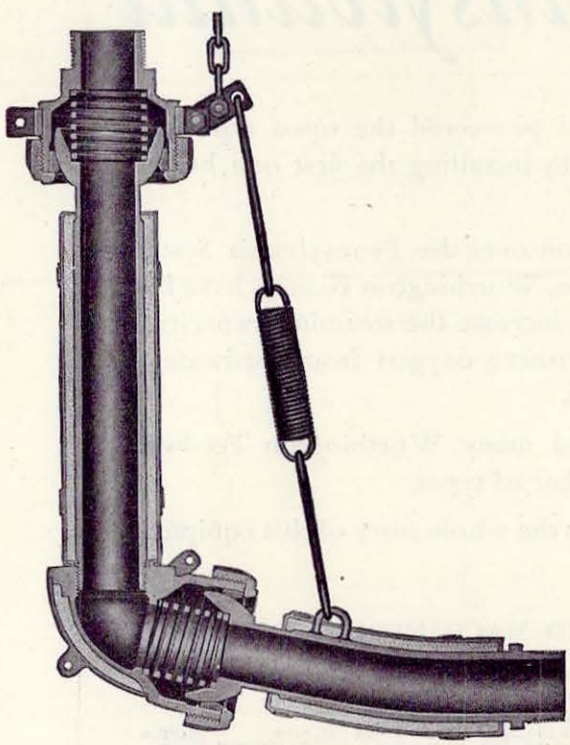

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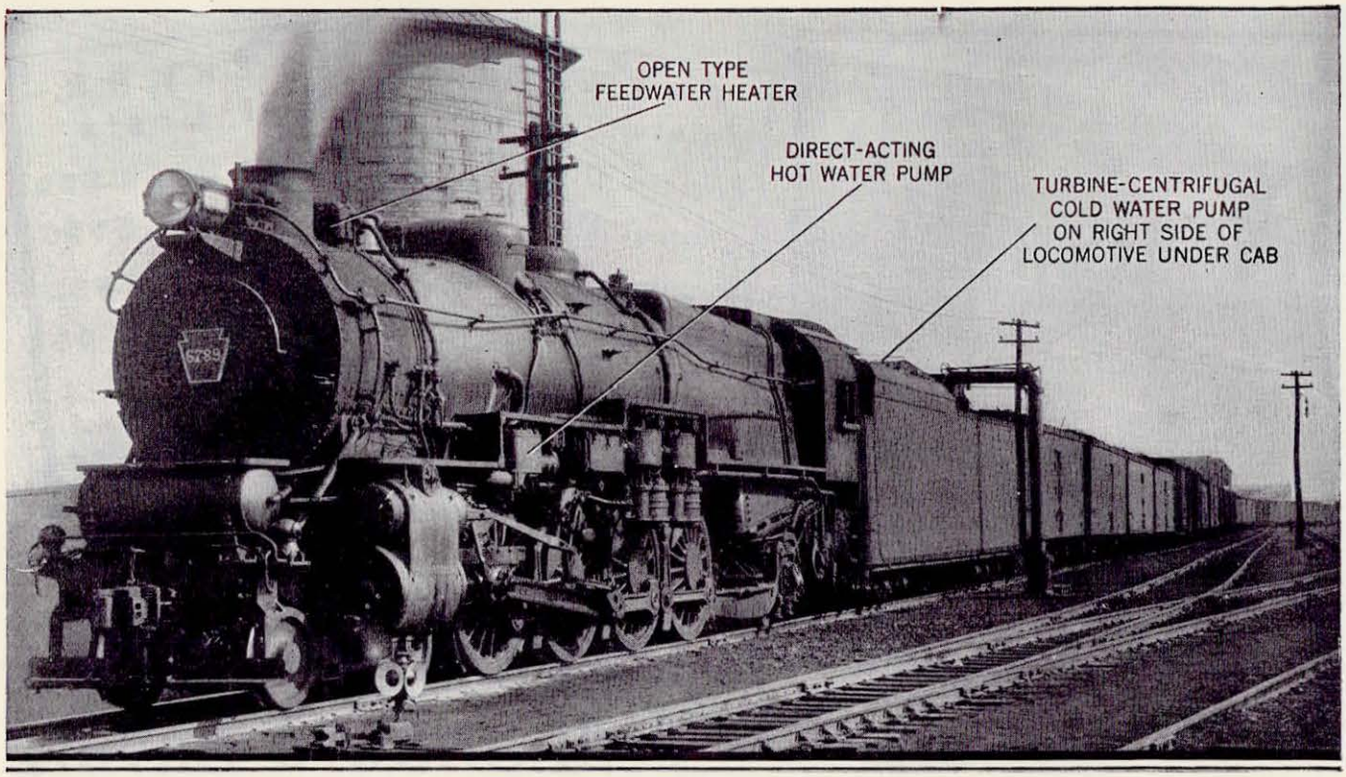

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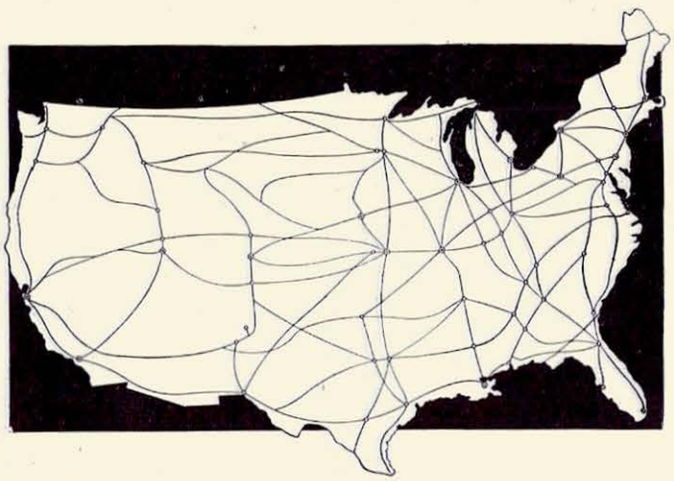

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for Cars and Locomotives

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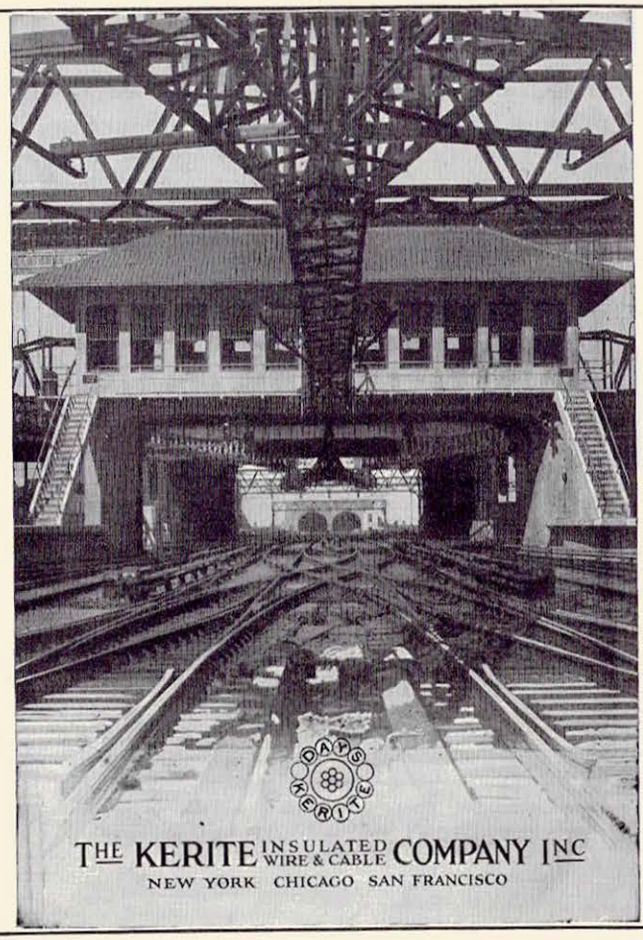

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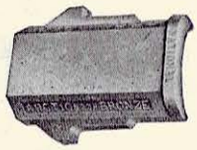

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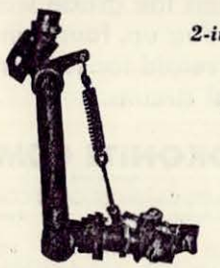

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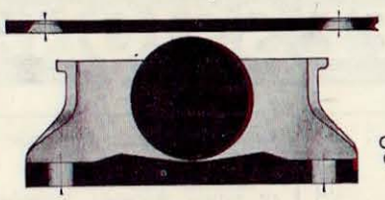
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For location of advertisements in this issue of manufacturers listed in the Buyers Index, see Advertisers Index on the last page next to cover

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Remington-Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

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New York Air Brake Co.
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Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
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Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
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Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

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Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
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Edwards Co., O. M.

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Central Alloy Steel Corp.
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Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
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Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

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Batteries, Starting.
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S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Symington Co., The.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
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Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The.
Standard Coupler Co.
Stucki Co., A.

Bearings, Side.
American Steel Foundries.
Chicago Railway Equipment Co.
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Stucki Co., A.
Wine Railway Appliance Co.

Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The.

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

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Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

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Illinois Steel Co.
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Midvale Co., The.
Ryerson & Son, Jos. T.
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Standard Steel Works Co.

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Barco Mfg. Co.

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Ingersoll-Rand Co.

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Oxweld Railroad Service Co., The.

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American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

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Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The
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International Nickel Co., The.

Bolts, Patch.
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Boring Machines, Car Wheel
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Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc., Wm.

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Oxweld Railroad Co., The.
Union Carbide Sales Co.

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Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Locomotive Finished Material Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
Q. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
New York Air Brake Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
Hammett, H. G.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtains & Fixtures, Car Window.
Pantasote Co., Inc., The.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Union Steel Casting Co.

Cylinders, Locomotive.
Locomotive Finished Material Co.

Cylinders, Oxy-Acetylene.
Oxweld Railroad Co., The.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Electro Metallurgical Sales Corp.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries
Baldwin Locomotive Works, The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Car Lighting.
Safety Car Heating & Lighting Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoists, Second-Hand.
Hyman-Michaels Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Logan Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.
Logan Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Logan Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Cuvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line(Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W. Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.
Safety Car Htg. & Ltg. Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.
Safety Car Htg. & Ltg. Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Locomotive Co., The.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Second-Hand.
Hyman-Michaels Co.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.).

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Milling Machines, Portable Frame Jaw.
Micro Machine Co.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America.

Multiple V Belt Drives.
Worthington Pump & Machinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service.

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.

Oil, Linseed.
National Lead Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing.
Westinghouse Air Brake Co.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Asbestos.

Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing Valve Stem.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America.

Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.

Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service.

Paper, Sheathing.
Carey & Co., Philip, The.

Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.

Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Air Brake & Clevis.
Champion Rivet Co.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe, Corrugated Iron
Armco Culvert Manufacturers Association

Pipe, Paved Invert
Armco Culvert Manufacturers Association

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Perforated Iron
Armco Culvert Manufacturers Association

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Steel Signal.
National Tube Co.

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.

Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Posts, Fence, Treated.
Century Wood Preserving Co.
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.

Preservatives, Wood.
Century Wood Preserving Co.
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.

Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.

Pulverizers, Coal — (See Crushers, Coal).

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Hyman-Michaels Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Rails, Relaying.
Hyman-Michaels Co.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Refrigerators.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Ringers, Bell
Hammett, H. S.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co
Inland Steel Co.
Ryerson & Son, Joseph T

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication)

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding, Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

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General Railway Signal Co.
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Railroad Supply Co.

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General Steel Castings Corp.

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Tubes, Boiler.
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Reading Iron Co.

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Valves, Blow-Off.
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Sellers & Co., Inc., Wm.

Valves, Drifting.
Ardco Mfg. Co.
Sellers & Co., Inc., Wm.

Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

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Ashton Valve Co.
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Valves, Pressure Regulating.
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Bradford Corporation.

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Sherwin-Williams Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

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Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

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Bird-Archer Co., The.
Dearborn Chemical Co.
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Permutit Co., The.

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Gould Coupler Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
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Weed Killer.
Q & C Co., The.

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Carnegie Steel Co.
Edgewater Steel Co.
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Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
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Carnegie Steel Co.
Edgewater Steel Co.
Mt. Vernon Car Mfg. Co.
Standard Steel Works Co.

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American Steel & Wire Co.

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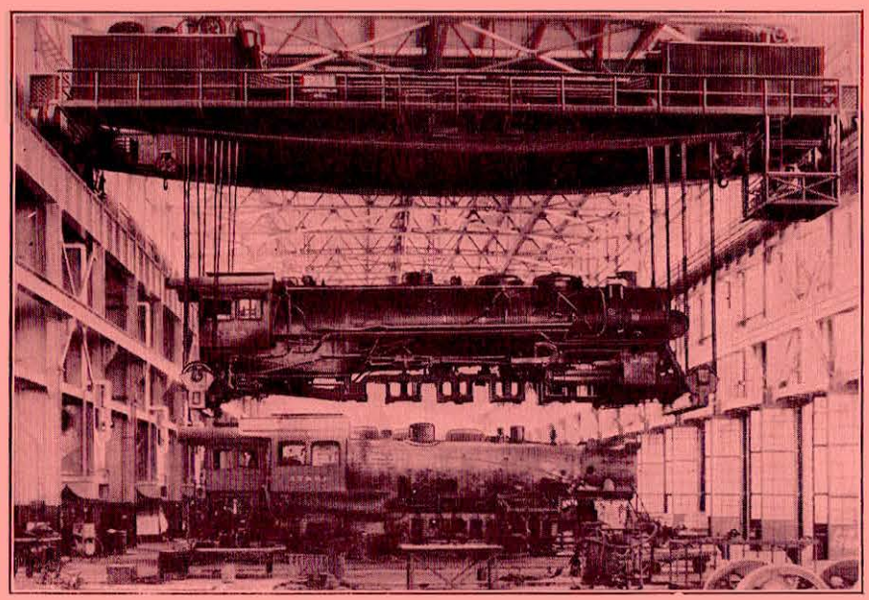

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"During the last few years 220 miles of double-track main lines on railroads in Ireland have been converted to single track . . . The savings thus effected and the success of the new methods of handling trains on the single-track lines naturally leads to the thought that perhaps certain sections of double track in the United States might well be converted to single track. . . .

"The most extensive continuous section of double track that was converted to single track is on the Great Southern . . . a total of 80 miles, this being a portion of the main line from Dublin to Galway, which handles a traffic of approximately 20 trains daily on the greater portion of the territory. . . .

"As to the economy to be accomplished by reducing the trackage, the annual report of the Great Southern for 1929 states that a reduction in expenditures of $893,460 as compared with 1928, was in part due to 'eliminating non-earning portions of the companies property, that is to say, by not maintaining two lines where one, with the new device now available, more than suffices for the efficient discharge of business offered or likely to be offered.' . . .

"In view of the fact that reliable and economical methods of directing train movements by signal indication are now available, it would seem that the American railroads have a lesson to learn from the Irish railways, i.e., that where traffic does not warrant the maintenance of two tracks, studies should be made to determine the economies of removing one track and providing centralized control on the remaining track."*

*Excerpt of editorial in **Railway Age**, January 31, 1931, page 269.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

75

Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour